# THE DESIGN PROCESS: DESIGNING INFORMATION TECHNOLOGY FOR THE PUBLIC SPHERE

by

Eileen Marie Gillette

A THESIS SUBMITTED IN PARTIAL FUFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF LIBRARY AND INFORMATION SCIENCE

in

The Faculty of Graduate Studies

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

October, 2010

## Abstract

The public sphere represents dynamic spaces in our cities and communities that attract mass users and that promote information sharing in multifaceted yet mutually beneficial ways, often through the use of information technology (IT). Gauging the effectiveness of current IT for the public realm raises key questions on how designers interpret, approach and create information technologies for public spaces. In this thesis, I explored different aspects of the design process in the public realm, specifically The Museum of Anthropology (MOA) in Vancouver, Canada. I investigated such questions as: What are the design goals of creating such a system? Who is involved? What are the challenges and opportunities? In order to better understand the thinking, practices and vision of people involved in the design process, this thesis conducted an in-depth case study of the Museum of Anthropology Collections Access Terminal and Digital Catalogue System (MOA CAT). The MOA CAT system is a new, interactive information kiosk and public access system designed for museum visitors to search, retrieve and explore the museum's collection. The methodology used in this thesis was a case study in which I interviewed participants involved in the design of the MOA CAT and reviewed documentation that spanned a decade of planning, building, and implementing the technology at the MOA. The purpose of this research was to understand the design process through the lens of the interdisciplinary team consisting of Information Manager, Designer, Project Manager, Communication Manager, Exhibit Designer and Museum Collection Manager. The findings emphasize that the design goals of the MOA CAT were to engage users, encourage exploration of information, and provide resources through an accessible information system. The design process observed in this case study of MOA demonstrated that design in the public and organizational spheres is an ongoing and fluid process driven by group collaboration and the formation and execution of key design goals, goals that ultimately encouraged meaningful interactions and exploration of a public space.

## Preface

This thesis research was approved by UBC Research Human Ethics Board, certificate number: H10-00509.

# Table of Contents

# List of Figures

## Acknowledgements

I offer my enduring gratitude to SLAIS faculty, staff, and fellow students at UBC who have inspired me to continue my work in this field. Thank you to the Museum of Anthropology (MOA) for their participation and support regarding my thesis work and case study research. I would also like to thank MOA library and administrative support employees for helping me find documents and providing me with a wonderful space in which to study and visit. This work was funded by a Social Science and Humanities Research Council of Canada (SSHRC) (awarded to supervisor) research stipend. I would also like to thank to Dr. Lisa Nathan for being part of my thesis committee and offering her mentorship and guidance. Lastly, I owe particular thanks to my supervisor Dr. Heather O'Brien who has supported me, mentored me and taught me to question more deeply.

## Dedication

I dedicate this thesis to my supervisor, partner, friends and family for their ongoing support, patience and mentorship.

# Chapter 1: Introduction

Multi-touch tables in museums, LED technology displays in public squares and computer kiosk systems in art galleries are examples of information technology (IT) designed to engage with a diverse public. The design of information IT in public places – particularly in cultural facilities such as museums, libraries and art galleries – is of high interest to citizens and knowledge purveyors alike. The purpose of this thesis was to explore the different aspects of the design process in the public realm, specifically a museum, and how the nature of design is a product of different situations and environments that ultimately impact the design of IT for public spaces. The motivation of this thesis was to explore the design practices and processes in the public realm. It investigated the design process of an IT system in a museum and sought to provide a better understanding of the expectations, decisions and vision of information technology in the public realm. It investigated such questions as: What are the design goals and trends of creating such a system? Who is involved? What are the challenges and opportunities?

Design process models are often applied to help provide an understanding of the activities of both designers and non-design professionals (Simon, 1969). The design process is often discussed in terms of a user experience and/or how individual users view the function and use of the information technology (Norman, 1988; Lieberman & Fry, 1995; Krajcik, Soloway, Norris & Quintana, 2000). However, there is a growing interest and discussion about the designer's experience in the development of information technology for the public realm (Rogers, 2004; Ciolfi, 2004). Public space is viewed in the context of physical spaces and includes the activities, behaviour and values attached to the public realm. Parks, city squares, museums and public institutions are examples of public spaces that are accessible to and provide interactions for diverse populations in our cities. Information technology that is designed for and integrated into the public realm should ideally reflect the types of activities and people that participate in public spaces - from both a technological and social perspective. This area of research

is increasingly imperative as IT becomes more pervasive and is used in public spaces that previously did not have a strong technological presence.

Museums have been integrating technology into their operations for some time, and other public spaces, such as airports, art galleries and city parks and streets, are increasingly integrating information systems that encourage individual and collective use (Chunghung, 1998; Griffiths, 2003). The design and planning of new technology, however, may point to an interesting trend of public institutions replacing aging information systems that were developed in the 1970's, 1980's and even as recent as the 1990's. The process of re-developing and advancing older information systems into new systems can provide opportunities to not only make information systems easy to use and accessible to diverse users, but also to design systems that are reflective of the space for which they are being designed.

With information systems developing at an increasing pace, there are social and technological pressures on public institutions to replace outdated information systems with new models. This presents both challenges and opportunities in how information systems are designed for the public sphere. A local example of an IT system being designed for a public space is the Museum of Anthropology (MOA) in Vancouver, British Columbia. For over a decade, MOA has recognized the need to replace their visual storage data books with a more accessible and user-friendly system[1]. The print composition of the data books made updating information about objects an inefficient, time-consuming process, and, as a result, museum staff recognized the need for a more innovative and user friendly system. MOA wanted to create an IT system that promoted greater public awareness of the museum's collection and facilitated different kinds of interactions with museum objects. Yet, how does a museum develop an IT system that fosters such interactions? What does the design process look like in a complex organization such as the museum? Unravelling the design process of IT systems in the public realm from the beginning stages of design to the final implementation provides insights that have value for future public design ventures.

[1] MOA's data books are generally defined as large, print books that describe anthropological objects and indicate their location within the museum.

In this thesis, I applied various design process models to a single case study in order to evaluate the design process in the public sphere. Case study methodology was adopted for this thesis because it provided a framework for exploring the design process from conception and planning through to implementation in order to understand how a design team – consisting of a Museum Collection Manager, Information Manager, Communication Manager, Project Manager, Designer and Exhibit Designer – collaborate to balance the opportunities and constraints imposed by the collection and the technology with the desire to craft an accessible and interactive interface for a diverse range of visitors. The technology selected for this case study was the Museum of Anthropology Collections Access Terminal and Digital Catalogue System (MOA CAT). Located at the Museum of Anthropology in Vancouver, British Columbia, the MOA CAT system is a new, interactive information and public access system designed for museum visitors to search, retrieve and explore MOA's collection. The MOA CAT was chosen because it is an innovative system and a leading example of the design and use of information technology in a public space.

This research seeks to contribute to knowledge about the design process of information technology in the public sphere in the following ways:

- To use case study methodology to investigate the development of MOA CAT in order to provide a greater understanding of the design process in a public space.
- To discuss the alignment of the design process with the museum's overarching strategic goals, and
- To examine how information technology can be harmoniously designed and integrated into public spaces.

The discussion of implementation practices and issues involved often focuses on the end result, or how the technology is accepted and evaluated by users, not on the experience of the design team, their shifting roles and visions, constraints and contextual circumstances, etc. The research conducted for this thesis seeks to build a deeper knowledge of the design process in a public setting.

The organization of this thesis is as follows:

- Chapter two synthesizes the literature about public space and the design of information technology in a museum. It focuses first on the design process from two dominant design paradigms: Rational Problem-Solving process (Simon, 1969) and reflection-in-action paradigm (Schön, 1983). Secondly, it considers the design process as a series of steps: Norman's (1988) Gulf of Execution and Evaluation model and the Museum of Science and Discovery Centre (DCWS) model (Chunghung, 1998). Lastly, it discusses how the design process may operate within an organization by summarizing negotiable and non-negotiable design constraints.

- Chapter three outlines the methods employed to carry out the case study of MOA CAT. It describes the two-tiered methodological approach taken to gather data for this thesis: 1) examining documentation such as academic literature, websites, newspapers, meeting minutes, press relations and other types of internal/external documents to gather background information about the technology and its place in the organization's history and mission, and 2) interviewing past and present MOA employees who were involved in the design of the MOA CAT.

- Chapter four presents the case study findings, focusing on the information gleaned from the examination of documents reviewed and the analysis of the interview data. Several themes emerged from the analysis of the documentation and the interviews. These are presented along with the challenges and opportunities associated with the development of the MOA CAT.

- Chapter five discusses the findings with respect to the literature about the design process, and addresses the implications and limitations of the study and ideas for future research in this area.

## Chapter 2: Literature Review

Chapter two will first review literature on public space and the design of information technology in the public sphere and museum spaces. Second, the literature review will outline the design process from 1) the perspective of two design paradigms: Rational Problem-Solving process (Simon, 1969) and reflection-in-action paradigm (Schön, 1983); 2) the design process as a series of steps: Norman's (1988) Gulf of Execution and Evaluation model and the Museum of Science and Discovery Centre (DCWS) model (Chunghung, 1998); and 3) how the design process may operate within an organization by examining negotiable and non-negotiable design constraints (Catalysts, 2009).

### What do we mean by the public space?

Public space, sometimes referred to as the public sphere or realm, is a multifaceted concept that is intrinsically linked to the ideas of accessibility, shared amenities and democratic values in North America. Public spaces, for example, encourage meaningful interactions in our communities and cities and are accessible to diverse social, economic, cultural and environmental activities (Francis, 1988; Howell, 1993; Landry, 2000; Eriksson, Hansen & Olesen, 2007). Public space is tied to the "ideas of discovery, of expanding one's horizons of the unknown, of surprise, of experiment and of adventure" (Landry, 2000, p. 119). Examples include parks, plazas, streets, pedestrian pathways and public facilities such as libraries and museums. No public space is the same, yet they share many commonalties including being open to diverse populations and are reflective of the free flow of public information exchange.

Public space has been well documented in architecture and urban planning, professions that build and plan spaces aimed at fuelling public interaction in our cities and communities (Eriksson et al., 2007). The important role public space plays in our everyday lives lies in the very idea and prospect of the social, economic, and cultural interactions that can take place in the public realm (Francis, 1988; Howell, 1993; Landry,

2000). According to Landry (2000), “the public realm plays a important role, as it encourages and helps develop creativity because it allows people go beyond their own circle of family, professional and social relations” (p. 119). For example, private spaces represent places that people are generally familiar with and comfortable interacting within both in the physical and social context. In contrast, public spaces expose people to new types of people, thinking and ideas that may inspire creativity, dialogue and dynamic social, cultural and economic exchanges that may not happen in the private realm.

The increase of urbanization and infrastructure development in our cities and communities has resulted in the public sphere undergoing significant and perhaps more importantly, rapid change. Many warn that public space is in danger of being taken over by privatization and market-based influences (Zukin, 1991). The effect of this transformation has resulted in spaces not reflecting local values and user needs, nor positively contributing to the economic, cultural and social well being of a community and/or city. This has resulted in segments of the population who do not feel welcome and/or that it is not their space to use (e.g. gated parks) (Zukin, 1991; Eriksson et al., 2007). This can also be seen with the presence of security guards in public places that deter “unwanted people” from using the space.

**Place and space**

For the purpose of clarity, this section will define space and place. Dovey (1985) defines place as, “a complex system of people, physical setting and meaning” (p.94). Whereas space is often viewed as insular and without meaning, place is the embodiment of interaction between people and the environment which thereby creates meaning (Dovey, 1985; Cresswell, 2004). The notion of place depends on the creativity and the human ability to make places meaningful and reflective of their needs in the public sphere (Cresswell, 2004). On a broader level, sense of place is born out of the experience people have and the meaning placed on the experience in diverse areas of interaction, rather than empirical measures and scientific knowledge (Dovey, 1985).

A sense of place plays an important role in designing public displays as it contributes to community identity and promotes meaningful exchanges and interactions with others in the public realm (e.g. digital community boards in community centres, where the public can leave comments and/or respond to other's comments). Sense of place is tied to memories, experiences and "patterns of behaviour we associate with the locale" (Landry, 2000, p.17). The knowledge gained from observing a space and the interactions that take place may lead to the development of information technology that enriches the space but does not disrupt it (Ciolfi, 2004). According to Colfi (2004), systems designed for the public realm must be attractive to users, encourage interaction within a space and be complementary to the activities that happen within the environment. This requires designers to understand the social, cultural, economic and personal exchanges and experiences that happen in a location and to design according to these observations.

In *Digital Ground,* McCullough (2004) discusses the theory of place for interactive designers. He argues that, for technology to enhance meaningful interactions, it is essential for interactive designers to map out the cultural patterns of interaction and the social relationships that exist within physical environments. This involves exploring the types of information ecosystems that exist within diverse environments and the need for technology to be "culturally grounded in place" (Messeter & Johansson, 2009, p.42). Thus, the design and use of information technology in the public sphere has become an emerging area of interest. This is largely due to interactive designers working within spaces that previously were not available to them such as outside spaces, streets, parks and public squares. For instance, different types of technologies have come to occupy or be the focus of many public spaces. Some examples include large light-emitting diode (LED) screen displays at football games and billboards in public spaces (e.g. New York Times Square and/or London's Piccadilly Circus), and touch screen tourist kiosks in parks and digital ads (e.g. digital TELUS billboards on public buses in Vancouver). Moreover, interactive designers now work with mobile and wireless information technology, creating new design models and capabilities for using information technology in public spaces. The advancements of information technology are also being applied in museums and other cultural spaces, providing interactive designers with opportunities to develop information technology in new creative ways and forms.

**Prior research: Design, information technology and public sphere**

Designers of technology have traditionally focused on the individual use of technologies in the private realm, such as devices that promote private and one-on-one interactions with technology (e.g. headphones, mobile phones and laptop computers) (McCullough, 2004). The individual and how he/she uses and experiences technology is still a dominant area of study in design (McCullough, 2004; Rogers, 2004). In the last twenty years Human Computer Interaction (HCI) research on both the individual and collaborative use of technology in work and education based settings has increased (Smith, Vega & McCrickard, 2008; Brignull, Izadi, Fitzpatrick, Rogers & Rodden, 2004). This research has focused on both how people work and learn collaboratively and independently through the use of technology (e.g. computer supported cooperative work (CSCW) (Smith et al., 2008; Brignull et al., 2004). Yet, it is important to note that although work places and educational settings represent the use of collaborative and individual-based technologies in a public setting (Brignull et al., 2004), they are also spaces that are not necessarily accessible to the mass public due to social, economic, cultural, and organizational structures that segment these spaces to select user groups.

In contrast, the design process involved in the production of information technologies in the public realm works in spaces that are accessible to diverse user groups and attract planned and unplanned human activity. This can be seen with the increased use of large LED screens, projectors and multi-touch technology in the public sphere that are specifically designed to engage and interact with the mass public (McCullough, 2004). In the following, I will discuss the design of an IT system in a museum space. Museums are dynamic and recognized public spaces that represent core values of accessibility and democracy. They are also generally open to and attract diverse audiences (Bearman, 1992; Hornecker & Stifter, 2006). Museums are also at the forefront of experimenting with information technology in the public sphere. For example, The Grammy Museum recently won an innovative design award for its interactive permanent and traveling exhibits. The Grammy Museum includes such exhibits as The Music Epicenter- an interactive exhibit spread against a curved wall where visitors can search though an assortment of images, historical videos and songs through the use of touch screen technology (Altman & Viste, 2009). The Museum of Modern Art (MoMA,

2010) in New York City recently added kiosks located throughout the museum that offer researchers, students and visitor's access to MoMA's vast collection (MoMA, 2010). Jointly, museums play an essential role in the collection, preservation, research and display of materials and artifacts. Interactive designers that create information technology in museums often work within the research and education based mandates of museums (Bearman, 1992).

**Museum spaces and information technology**

Museum spaces are often viewed as places of discovery and education facilitated by access to museum objects. Technology designed for these spaces should ideally reflect these values and encourage exploration of the museum objects (Ciolfi & Bannon, 2003; Bannon, Benford & Bowers, 2005). Designing technology that contributes to bringing people together to explore objects, history, and knowledge may promote meaningful exchanges and interactions with others in museums. Understanding the process of designing an information technology system for a museum space and how it may be designed to work within a museum and encourage visitors to explore a museum's collections may facilitate a better understanding of the design of IT in the public realm.

It is important to note that there is some resistance in the museum world to using information technology within museum spaces, as some museum staff and leaders feel that information technology distracts people and detracts from interacting with museum objects and collections (Anderson, 1999; Griffiths, 2003). There is an opportunity for museum staff engaged in designing information technology to share their knowledge in this area and address concerns people may have regarding the design and use of IT in a museum. For instance, museums can learn from each other by documenting the design process behind developing IT systems that are intended to be accessible, facilitate exploration of the museums physical space, and engage users to participate within the museum (Anderson, 1999; Griffiths, 2003).

The debate over the use and application of technology is not new, as museums have been discussing the need to make their collections and information more engaging and accessible since the early 1900's (Griffiths, 2003). In 1903, Art historian Dr. Lichtwark envisioned a "great revolution in the equipment and methods of museums" (Griffiths,

2003, p.1). Additionally, curators and museum staff during this time discussed the need to change the design of exhibits and museum spaces to make them more accessible to the public (Griffiths, 2003). The desire to make museum collections more physically accessible may not be a new area of study, yet today this discussion is becoming increasingly tied to the design and use of digital technology (Chunghung, 2008; Griffiths, 2003). Digital technology offers new ways to design systems that are visually appealing, interactive, and capable of being integrated into the museum space in ways that were not possible ten years ago (e.g. touch screen technology). The design process of IT has also become more inclusive through such practices as participatory design and community consultation (Rogers, 2002). Museums are also trying to understand how the public experiences technology both within and outside of the museum. Knowledge gained through observing how the public uses technology may help to design technology that is flexible and open to multiple ways of learning and interacting in the museum (Ciolfi & Bannon, 2003; Bannon, et al., 2005; Chunghung, 2008). In other words, the technology should enrich the space but not disrupt it (Ciolfi, 2004).

In order to design information technology for public use that is attractive to users, encourages interaction within the space, and complements the activities that happen within the environment, designers must understand the social, cultural, economic and personal exchanges and experiences that take place in the setting and design accordingly (Ciolfi, 2004). In the case of the museum, this may involve the designer understanding the museum's users, mission and values in order to design information technology that meets the goals and expectations of both the museum and its users (Ciolfi & Bannon, 2003; Bannon, et al., 2005).

The design process involves setting goals regarding the function, use, and design of information technology and, most importantly, how it will be executed on the ground. In the following section, I will outline key design process models from first a design paradigm perspective by describing Rational Problem-Solving process (Simon, 1969) and reflection-in-action paradigm (Schön, 1983). These are two dominant design paradigms that have contributed a better understanding of the design process from a positivist and/or constructivist lens. Second, I will outline how the design process may be viewed as a series of steps by discussing Norman's (1988) Gulf of Execution and Evaluation model, and the Museum of Science and Discovery Centre (DCWS) model

(Chunghung, 1998). Lastly, I will discuss how the design process may operate at an organizational level by outlining negotiable and non-negotiable design constraints. By summarizing and outlining the design process through the use of various design models, I draw attention to how the design process may be defined and analyzed from different design perspectives. Thus, there is no one design process model to apply in the study of design, as they all contribute to a richer understanding of the design process of IT for the public sphere. In the following, I will discuss the two dominant design paradigms applied to the study of the design process: Rational Problem-Solving process (Simon, 1969) and the reflection-in-action paradigm (Schön, 1983).

## Design process models

### Design paradigm perspective: Rational Problem-Solving process vs. reflection-in-action paradigm

There are numerous theories, philosophies and schools of thought that guide the design process (Lawson, 2006). According to Dorset and Dijkhuis (1995), the two dominant design paradigms applied to the study of the design process are the Rational Problem-Solving process and the reflection-in-action paradigm. The Rational Problem-Solving process is evaluated within a positivist paradigm (Dorst & Dijkhuis, 1995). This approach may be described as a problem solving process that involves deconstructing the design process and reducing it to manageable solutions (Simon, 1969; Dorst & Dijkhuis, 1995). In order to find these solutions, the designer goes through the basic design cycle that uses four activities: analyze, synthesize, simulate, evaluate (Simon, 1969; Hummels & Frens, 2008).

The Rational Problem-Solving process views the design process as a cyclical scientific-like model, where design consists of problems that may be solved though a series of steps that are known and followed by the designer (Parnas & Clements, 1985). This process is useful when the design problem is well laid out and understood by the designer, and when the designer, in turn, is aware of the steps required to deconstruct and evaluate the problem during the design process (Dorst & Dijkhuis, 1995).

Critiques of the Rational Problem-Solving process often surround the lack of analysis over creativity and individual styles of design, as the paradigm is based on a series of prescriptive steps that the model assumes the designer is aware of and regularly executes. Simon's (1969) design cycle also fails to acknowledge that the designer may not follow the steps (i.e., analyse, synthesize, simulate, and evaluate) in the order outlined and may also go through the cycle numerous times, starting from different points and perspectives (Parnas & Clements, 1985). Moreover, the design process is viewed as fixed and inflexible to new ideas that may arise during the process. It also makes the assumption that the designer is aware of all the problems and the necessary steps required to solve them in the design process. For instance, design solutions to a problem may not follow any structured and/or well-known design practice. Lastly, the Rational Problem-Solving process does not address the fact that some design challenges are difficult to solve due to outside influences that the designer has no control over and may require the designer to problem solve collaboratively with others. In addition, some design problems cannot be solved, no matter the steps, approach or model a designer may follow.

A competing paradigm is Schön's (1983) reflection-in-action model, which is based within a constructivist paradigm (Dorst & Dijkhuis, 1995). Schön (1983) argues that each design problem is unique and depends heavily on professional and creative knowledge of the designer. From this perspective, design cannot be analyzed within a scientific framework, as the design process is seen as a reflective practice that is influenced by a range of factors and design needs. Dorst and Dijkhuis (1995) suggest that reflection-in-action is useful in the conceptual state of the design process, where the designer is exploring different options in the design of a product. Schön stressed that 'knowing-in-action' is important, but it is difficult to formalize practitioner's knowledge and pass it along to others. The reflection-in-action paradigm, according to Schön, helps guide the practitioner to others in the design process. For example, in this process the designers may go though four steps: 1) naming (the relevant factors in the situation), 2) framing (the problem), 3) moving (towards a solution), and 4) evaluating (the moves) (Hummels & Frens, 2008). The steps incorporate the knowledge and skills of design practitioners and the need to reflect upon the design process. Schön (1983) also states that the design process varies depending on the practitioners involved and the level of challenge inherent in the design project. Schön, similar to Simon, views the designer as an

individual and/or expert in the field, failing to recognize how other people influence and contribute to the design process.

The two paradigms highlight the importance of information gathering and the need to evaluate the process, yet they both fail to capture how designers generate knowledge from the process and how this knowledge may be executed in the design process (Parnas & Clements, 1985). For example, the Rational Problem-Solving process in particular, fails to address the flexibility of the design process in terms of practitioner knowledge. Moreover the two paradigms view designers as individuals who approach design in a structured way, where some may view the design process as having both structured and non-structured elements.

There are, however, positive aspects of the two paradigms that can be applied to better understand and frame the design process. The Rational Problem-Solving process, for instance, highlights that breaking down the design process into recognized steps may help in framing the design process, whereas the reflection-in-action paradigm stresses the idea that practitioner knowledge and creativity are valuable aspects within the design process. In the following, I will discuss two models that outline the design process as series of steps: the first being the Norman's (1988) Gulf of Execution and Evaluation model, which views the steps of the design process as flexible and applied as a way to help lead designers through the design process, and the second example known as the DCWS model (Chunghung, 2008), which outlines the design process from a prescriptive and managerial standpoint. In contrast, to the Rational Problem-Solving process and reflection-in-action paradigms, Norman's Gulf of Execution and Evaluation model and Chunghung's DCWS model explore different areas of the design process and provide a different lens through which to understand the design process.

**The design process as a series of steps: Norman's Gulf of Execution and Evaluation vs. Chunghung's discovery centre work stage model (DCWS)**

The Gulf of Execution and Evaluation model is based on Norman's (1988) observation of human cognitive processes and how people interact with the world. Norman states that human action has two aspects - execution and evaluation. Execution involves doing something whereas "evaluation is the comparison of what happened in the world with what we wanted to happen (our goal)" (Norman, 1988, p. 47). Norman outlines the Gulf of Execution and Evaluation model through seven stages of action. The first four stages focus on execution:

1. Forming the goals (what a designer wants to achieve),
2. Forming the intention (planning to take action on the design goal),
3. Specifying an action (deciding on what and/how a product is going to be designed), and
4. Executing the action (designing the product).

The first three stages above are viewed as the mental process of design as nothing happens until the design is executed (step 4).

The stages of evaluation in the action cycle include:

5. Perceiving the state of the world (i.e. observing how the technology is being used and/or how it is perceived by users),
6. Interpreting the state of the world (i.e. making sense of why users interact with a technology in a particular way), and
7. Evaluating the outcome (i.e. determining whether the product meets the initial design goals and aspirations of the designer) (Norman, 1988, 45-48).

Norman (1988) notes that gulfs may exist within the seven stages of action. For example how does the way in which designers apply their thinking and ideas on design (stage 3) translate into the actual physical design of a product (stage 4)? In terms of the design process, what types of gulfs exist between execution and evaluation? It is the constant evaluation of the model that makes the seven stages of action "a valuable design aid" for

providing a basic checklist of questions to ask to ensure the Gulf of Execution and Evaluation are bridged in the design process (Norman, 1988, p. 48).

Norman (1988) states that the seven stages outlined form an approximate model; not all the steps are necessarily done in sequences and/or on their own. He defines the model as having a “continual feedback loop, in which the results of one activity are used to direct future ones, in which goals lead to sub goals and intentions lead to sub intentions” (p. 48). The model suggests that designers, researchers and others should be asking focused questions throughout the design and evaluation process. Norman argues that the design process as not static and requires the constant re-evaluation of the design goals and how users approach and employ diverse systems.

In contrast Chunghung (2008), in *Mapping the Design Criterion Framework for Museum Exhibition Design Project*, outlines the discovery centre work stage (DCWS) planning process, developed in 1998 by MET Studio based on exhibition design framework for the Museum of Science and Discovery Centre - a science museum that promotes the public understanding of science, technology and history (Chunghung, 2008; MET Studio, 1998). The DCWS model is a prescriptive process for multidisciplinary conceptual work in interior and exhibition design that outlines a “conceptual framework based on the nature of project practice in design, design management and new product development” (Chunghung, 2008, p.3)

The DCWS consists of five stages (Chunghung, 2008, p.3):

1. Concept brief
- The museum requirements
- Drawing and requirements
- Outline timetable and cost analysis
- Development of exhibition purposes

Output: 1. Working schedule and financial set out; 2. Preliminary definition & concept proposal; and 3. Permission to proceed with project.

2. Concept design

- Concept design development
- Survey of cost analysis

Output: Approval of Concept design

3. Detailed design

- Development and approval of concept design
- Provision of written specification
- Detail layout (mechanical, technology and electrical)
- Storyboards and layout of graphics
- Cost checks

Output: Design drawings approval and design completion.

4. Implementation

- Developing of “tendering purposes”
- Invitations to tender
- Monitoring, construction and installation
- Financial report

Output: Design change and prepare for construction.

5. Completion

- Issues of certification of practical completion
- Mentoring the condition of all structure and exhibits
- Mentoring the correction of defects

Output: Fulfilment of business objectives and issues of certification of completion.

The MET studio framework focuses on museum exhibit design; it provides insight about the design process that takes within the museum setting. The objective of the DCWS model was to gain a clearer understanding of exhibition design communication and to establish an integral and realistic approach to planning, designing, and managing the project (Chunghung, 2008). The process maps the flow of communication between tasks

and disciplines in a prescriptive way so as to persuade and encourage designers to achieve the project work (Chunghung, 2008). For example, the DCWS model sets out a series of prescriptive steps that outline how the design process is structured. Each stage represents a particular set of detailed work and responsibility and emphasizes the "terms of engagement between curators, designers, museum specialists and architects" (Chunghung, 2009, p.3).

While the Gulf of Execution and Evaluation model is based on lived experiences and views the design process as fluid and the steps as guidelines to follow and understand the design process, the DCWS model outlines the design process as a more step-by-step approach. Moreover, Norman (1988) emphasizes the need to investigate the design process by understanding the designer's mental model – the designer's perception of the world around them. The design model is "held and dictated by the designer"; it involves examining the designer's lived experience, training, skills and how they generally approach design and the user model (Lee, Chewer, McCrikard, 2005, p. 377). The design model focuses on the need for designers to facilitate user's evaluation and execution of tasks. For instance, according to Norman the design model may be "analyzed as stages of action, which describe the evaluation and execution of tasks across the Gulf of Execution and Evaluation" (Lee, et al., 2005, p.377). Unlike Norman's Gulf of Execution and Evaluation model, the DCWS model outlines the design process from a managerial and organizational standpoint that defines the process of managing tasks, staff and designers (Chunghung, 2009). Understanding the design process from a prescriptive model may be helpful in organizing and analysing the design process regarding the development of timelines, budgets and contracts, key elements of the design process that are not stressed in Norman's Gulf of Execution and Evaluation model.

Norman's (1988) designer model may provide a way for the designer to understand and reflect on how users may implement a design and/or IT system. For example, Lee, Chewar and McCrikard (2005) applied Norman's Gulf of Execution and Evaluation model to document the design process of the LINK-UP system and how it relates to the user model. They argue, "the design model should be inspired by a requirements analysis, including consideration of a user's background, situational context, and task-oriented goals" (p. 377). Lastly, Rizzo, Marchigiani and Andreadis (1997) discussed the design

issues encountered by the AVANTI project and developed a cognitive walkthrough method based on Norman's model of action. Norman's model has been applied in diverse areas of design work and generally applied to better understand the designers' lived experiences.

Adversely, the Chunghung (2008) model, which was formulated with museum, administrators and managers in mind, focuses only on interior and museum exhibit design and, as a result, largely influenced the Museum of Science and Discovery Centre design process. While the model focuses on steps that may aide museum staff in managing and organizing the design process, it fails to stress the important role that designers, as facilitators of knowledge, and museum patrons, as participants in the museum experience, play in that process.

It should be noted that Norman's (1988) Gulf of Execution and Evaluation model and Chunghung's (2008) DCWS model both fail to address the importance of documenting the knowledge generated and lessons learned from the process in the museum. Norman fails to document the organizational aspects of the design processes such as budgets, contracts, and timelines, where the Chunghung's DCWS model is inflexible and neglects to discuss how unplanned events challenge and/or raise opportunities to impact the overall design process. The design process is often led and managed by organizations. In order to address the design process from an organizational standpoint, I will next investigate the design process from two organizational perspectives: negotiable and non-negotiable constraints.

**Design from an organizational perspective: Negotiable and non-negotiable constraints**

At an organization such as a museum, the design process may be defined as the management of constraints (Catalysts, 2009, Guindon, 1990). Design constraints can be distinguished in two categories: negotiable and non-negotiable (Catalysts, 2009, p. 9). Negotiable design goals are goals that may be adapted and changed, where non-negotiable constraints may be seen as design goals that are not flexible. From this perspective, the first steps of the design process in museums may involve the designer and museum staff (e.g. information manager, communication manager and exhibit

designer) in outlining and clarifying the parameters of the design, such as time, space, location, efficiency, technical restrictions and budget. The process of identifying and understanding the constraints of the design is often laid out in what is called a design brief (Catalysts, 2009). A design brief documents a museum's aims, objectives and time required to finish the design. Its purpose is to ensure that the designer understands the non-negotiable constraints and expectations of the design (Chunghung, 2008). For example, some common non-negotiable design constraints may include: 1) Lasts a long time; 2) Easy to maintain; 3) Looks attractive; 4) Incorporates the latest technology and most importantly 5) Works as it should (Ullman, 2003). The design process, however, may also require the designer and museum staff to ask what types of constraints may be negotiated and what ones cannot (Catalysts, 2009). For example, if the museum's design budget is low, this may require creative thinking on the part of the designer about how to reuse resources and information already available, or how the designer can create a system that is flexible enough to support new technology applications when more monies become available. The management of constraints ensures that discussion occurs and understandings are reached between the designer and client (Ullman, 2003; Catalysts, 2009; Chunghung, 2008).

Understanding the design process within museums requires research and discussion of key steps, the design goals and processes that may need to take place before the design of the information systems begins (Chunghung, 2008). The steps in the design process vary, yet there is often a set of "best practices" and well known challenges that may be negotiated and discussed throughout the entire design process (Ullman, 2003).

**Summary**

Chapter two provided a review of the literature on public spaces and the design of IT systems in the public realm, specifically focusing on museums. Literature on public spaces and the design of technology in a museum space demonstrated that the development of new IT systems in the public sphere might offer new opportunities in design. Yet, technology implemented into a space just for the sake of technology should not be the driving force behind the design process, as IT systems need to be designed to reflect the activities that take place within a space. For instance, the literature reviewed discussed how technology should be designed to enhance and add value to

the space, not simply a piece of technology that is integrated into a space without a specific purpose and/or function.

The literature reviewed on the design process first discussed two dominant design paradigms: Rational Problem-Solving process (Simon, 1969) and reflection-in-action paradigm (Schön, 1983). The Rational Problem-Solving process outlines the design process as a prescriptive model with a series of steps that are well understood and followed by the designer. In contrast, Schön reflection-in-action paradigm demonstrates the importance of practitioner knowledge and reflection in the design process. Schön stressed that the design process is dependent upon the knowledge of a designer and how this may be reflected upon and applied and shared in the design process. Although more flexible in his approach, Schön neglects to emphasize how design knowledge is gathered and information may be passed down to others in the design field.

Second, I discussed how the design process may be viewed and analyzed as a series of steps by summarizing the seven stages of actions from Norman's (1988) Gulf of Execution and Evaluation model and the Museum of Science and Discovery Centre (DCWS) model (Chunghung, 1998). Norman's Gulf of Execution and Evaluation model focused on the action of design, design goals and also provides a HCI perspective on design such as the need to create products that are attractive, easy to use, or ergonomic (Norman, 1988). Norman (1988) also presents the steps in the design process as something fluid and ongoing. Norman's model, unlike the DCWS model is more practitioner based and identifies the many phases and steps that may take place in the design process. Norman, similar to Schön (1983) views design as a creative practice that does not necessarily follow a set of rules and procedures.

The DCWS model, presented by Chunghung (2008), illustrates that the design of museum exhibits is becoming more complex with the introduction and use of digital technology in museums. Chunghung also highlights how the design process may be broken down into manageable steps that may help designers solve problems that arise during the design process. The DCWS, being a prescriptive model, reflects the ideals of the Rational Problem-Solving process (Simon 1969) where design is understood though a series of design steps that needs to be managed, understood and evaluated throughout the design process. Thus, neither the Rational Problem-Solving process

(Simon, 1969) nor the DCWS model (Chunghung, 2008) completely accommodates how real life scenarios may impact and/or change the design process.

Lastly, I analyzed negotiable and non-negotiable design constraints from an organizational perspective. This perspective outlines how design goals guide the design process and how they need to be constantly revaluated throughout the design process. The discussion on negotiable and non-negotiable constraints also reflects Norman's (1988) Gulf of Execution and Evaluation model. For instance, Norman's (1988) argues that the formation of design goals is the primary step in the design process and acknowledges that design goals may need to be adapted and/or changed, as a range of unforeseen factors and events may influence them during the design process.

The literature reviewed offers different and competing perspectives on the design process. The two design paradigms: Rational Problem-Solving process (Simon, 1969) and reflection-in-action paradigm (Schön, 1983) discuss the approaches that designers may apply in solving design challenges from a constructivist or positivist lens. The design models that emphasize a step-by-step model (i.e., Gulf of Execution and Evaluation model and DCWS model) outline how the design process may be analyzed from a holistic and/or a prescriptive and managerial lens. Lastly, the discussion on the negotiable and non-negotiable design constraints illustrate how the design process may operate within an organization and how design decisions regarding design goals are negotiated and decided upon. In some of these perspectives, the design process is a flexible and creative process (Schön, 1987; Norman, 1988; Catalysts, 2008), whereas other perspectives may view design as a prescriptive process with a set of well-known steps that are followed by a designer and/or design team (Simon, 1969; Chunghung, 2008).

I am interested in understanding the practices and processes of designing information technology in the public sphere, focusing on a museum space. Specifically, I sought to document the creative process and engagement of the design team, and the ideas, feelings, and behavior that occur throughout the design process of the MOA CAT system. The design process may be best understood through the application of multiple design models and perspectives, as none of the design models outlined here completely address the complex nature of the design process of IT in the public sphere. For

example what did the designer and museum staff learn from creating the design brief and work plan? Was it an accurate description of what happened during the design process? What would the designer and/or museum have done differently? Asking particular questions and gathering information from multiple perspectives on the design process may tell a more real and dynamic story about the design of an IT system in the public sphere, particular a museum space. In the following chapter, I will discuss the methodology I used to explore the design process of the MOA CAT system from conception and planning through to implementation.

# Chapter 3: Methods

Case study methodology was used to describe the development of the Museum of Anthropology Collections Access Terminal and Digital Catalogue System (MOA CAT), to examine the alignment of the design process within MOA's overarching strategic goals, and to garner the perceptions of the multidisciplinary design team who designed and integrated an IT system into the museum's space and infrastructure. Through the case study methodology, the design process is looked at through a holistic lens, which adds knowledge to the current environment and professional perspectives on IT technology for a museum.

### Case study research

This thesis employed a single case study at the Museum of Anthropology (MOA), British Columbia and explored the design process in the development of the MOA CAT. This involved background research on the MOA CAT system through academic literature, websites and newspapers, meeting minutes, press relations and other types of internal/external documents that highlighted how the design process was discussed and defined in the documentation. In addition, six semi-structured interviews with past and present MOA employees involved in the design of the MOA CAT were conducted. The individuals interviewed for this case study included a Museum Collection Manager, Information Manager, Communication Manager, Project Manager, Designer and an Exhibit designer. They were chosen for the case study because of their role in the design process and/or implementation of the MOA CAT. The interviews provided context and knowledge about the evolving design process of this system intended for use in the museum and, in future, the Web.

This research is an in-depth case study that investigated contemporary phenomena within a real world context (Flyvbjerg, 2006). Case study research has been applied to document and inform others on how information technology is designed, tested,

evaluated and used by people in diverse environments (Carroll, 2003; Corry, Frick & Hansen, 1997; Smith et al., 2008). This is particularly seen in scenario-based design where case studies are applied to outline practices used in the design process and provide context to the design and use of the technology (Parker, 1996; Smith et al., 2008; Carroll, 2000). In light of the goals of this thesis, the case study was seen as an appropriate methodology. It can be used to highlight key people, stages and trends that occurred that occurred in the design of a specific information technology (MOA CAT) and in a specific setting (MOA). In terms of a museum and the design process, case studies are frequently utilized to outline practices used in stages of the design process in a museum and provide context to the design of an exhibit and/or space.

**Current study: Case study of the MOA CAT**

This case study was designed to collect rich data on the various practices, people, processes, existing patterns and relationships that exist in the creation of an information system, MOA CAT, for use in the public sphere. The purpose of the MOA CAT case study was to provide different perspectives and viewpoints about this real life design situations and relationships. The case study provided a way to collect information on MOA CAT and document the ideas and lessons learned from building an information system for the public sphere.

Results of this case study may be shared with others, such as information stakeholders and researchers, to better understand the design model in the public sphere from different perspectives and research areas (Flyvbjerg, 2006, Parker, 1996; Smith et al., 2008; Carroll, 2000). It may also be used in conjunction with additional case studies in future to compare design models for a museum IT system, and as a learning tool to assess the decisions made throughout the design process.

The following sections describe the processes of documentation and conducting interviews with MOA employees, and the types of data this generated. I will also describe the organization of the data and my approach to understanding the findings and presenting them.

**Documentation process**

The initial phase of the case study research was reviewing documents, press releases and MOA's website that discussed both the MOA CAT and the MOA multi-year renewal project – "Partnerships of Peoples Project." It's important to note that MOA CAT was a small project that happened during a multi-year renewal project. Thus information on the MOA CAT, technology and visual storage was spread throughout the documents reviewed for this thesis.

The key documents reviewed for the case study were found and provided by MOA's library and/or available online on MOA's website. The key documents reviewed at the MOA CAT library and MOA's online resources included:

**1. The renewal project executive summary and feasibility study:** The Executive Summary and Feasibility Study provided context for the goals and objectives of the MOA's multi-year renewal project. For the purpose of this case study, the areas studied in these documents focused on visible storage, the Multiversity Galleries (MVG) and information technology. There is limited mention of the MOA CAT in this document, yet it outlines the goals of the renewal project and how these were linked to providing accessible information to the public and research through technology (Museum of Anthropology, 2004)

**2. Visible storage documents and academic articles**: The MOA library had an assortment of articles and background information on visible storage dating back to the 1970's. This information provided an historical overview of visible storage and the important role MOA has played in leading visible storage ideas and space in museums. The MOA CAT replaced the visual storage data books and has become part of the history of visible storage. Reading these documents aided in understanding the backdrop and history of visual storage and the need to develop information technology systems for the MVG at MOA to make information more accessible to the public and researchers.

**3. MOA's website:** The MOA website in many respects is the public face of MOA, as it communicates to the public, events, projects and research taking place at the museum. For example, MOA's website provided information on the museum, such as its key mission, mandate, collections, and key events. The website also provided press releases on the Partnership of Peoples Project (MOA's multi-year renewal project), the Multiversity Galleries (MVG)2 and the MOA CAT.

**4. Newspaper articles:** Although limited, newspaper articles about MOA's Partnership of Peoples Project and The Multiversity Galleries were reviewed. The sources for these were local newspapers such as the *Vancouver Sun*, *Georgia Straight* and *Westender*. The articles provided basic information and key quotes from museum staff on MOA's renewal project and the MOA CAT.

**Documentation data preparation and analysis**

After the documents were reviewed, notes from the documentation were transferred into a Microsoft Excel worksheet and information was organized under the following categories: MOA, visual storage, MOA CAT, technology, and the MVG. This was done to organize the information and aide in recognizing and writing about the main themes to emerge from MOA CAT case study.

In addition to reading about MOA CAT in the museum's documentation, I visited MOA and explored the MOA CAT. This involved eight site visits to the museum for approximately one hour each time. The site visits involved documenting the functions of the MOA CAT, exploring MOA collections through the use of the system and taking pictures of the MOA CAT within the MVG space. The site visits enabled me to describe the look, feel and functions of the MOA CAT system. The notes documenting the site visits were handwritten and later transferred into a Microsoft Word document for review and analysis.

[2] Multiversity Galleries (MVG) consist of open storage space with some 16,000 objects stored in cabinets with drawers that slide open to reveal their contents. The MOA CAT was designed to work in conjunction with the MVG (Lee 2010; MOA, 2010).

**Interviews**

The participants interviewed for this study all had expert knowledge of the MOA CAT and provided rich insight into the production of the information technology. Interviews recorded the multiple perspectives and viewpoints of key individuals – Museum Collection Manager, Information Manager, Communication Manager, Project Manager, Designer and Exhibit Designer. The six participants played a key role in the planning, development, design and implementation of the MOA CAT system at the museum. The interview process was designed to facilitate open and fluid discussion concerning the thinking and practices that went into the production of the MOA CAT.

Permission was sought from the Assistant Director of MOA to contact employees and request an interview. Once permission was granted, MOA's Information Manager supplied the names of six potential participants who worked in some capacity on the design of the MOA CAT. The six participants listed by the Information Manager received an email cover letter describing the nature and objectives of the research project. The cover letter outlined the research time frame, proposed nature of the study, and expected research outcomes. All six agreed to be interviewed. Upon agreeing to participate, they were emailed a consent form and proposed questions prior to the interview. This gave them an opportunity to read, reflect upon, and consider any questions they may have about participating. Follow-up regarding the time and place of the interview was done through email communication.

The people interviewed for this case study included: Museum Collection Manager, Information Manager, Communication Manager, Project Manager, Designer and Exhibit Designer. The interviews took place between June 1, 2010 and July 30, 2010 and all participants consented to have the interview recorded, transcribed and used as data for this thesis. The interviews were approximately an hour in length and recorded by Livescribe recorder pen. Five of the six interviews were conducted in person at MOA; one interview was conducted via Skype as one participant did not live in the local area.

The interview questions were formulated to explore the design model of the MOA CAT system. They were designed to start a conversation and act as speaking points about the design of the MOA CAT. The interview questions were as follows:

- How did you approach the design of this MOA CAT?
    - Probe 1: How did you secure the contract?
    - Probe 2: engagement, social value and/or entertainment
- How did you gather background information on the MOA CAT before beginning the project?
    - Did the early design plan change? Did your vision change?
- What challenge and opportunities did you encounter?

The interviews were discussion based and questions were not asked in sequence. In the beginning and at the end of the interviews the participants were thanked for participating, and asked to provide any further thoughts regarding the thesis research.
The audio files of the interviews and transcription data were stored on password-protected computer. The information collected for this case study did not contain the interviewees name and/or affiliation, unless consent was given.

**Interview data preparation and analysis**

After each interview, the audio recording of the interview was saved to a computer and then transcribed. The transcribed data was organized by the interview questions asked of participants and then analyzed through the use of content analysis. Content analysis of the data consisted of finding and organizing the data under 1) key words, 2) common trends and, 3) differences found in the data. From here the data was organized under key themes, challenges and opportunities which are outlined in the following results section. Content analysis was applied to analyse the case study of the MOA CAT data, as it is a useful method for describing and making inferences about the characteristics of the data such as comparing interview transcripts, describing trends, similarities and differences in the case study data. The results are discussed in greater depth in chapter four.

# Chapter 4: Results

The following section provides an analysis of the data gathered over the course of the case study. In part one, I draw upon the information gathered from documentation (reports, annual reviews, etc.) to establish the context for the development of the MOA CAT. In part two, I will focus on the data gathered from the interviews and highlight the specific themes that emerged from data pertaining to the design of MOA CAT.

### Part one: Context for the case study

### The Museum of Anthropology

The Museum of Anthropology (MOA) is located in Vancouver, British Columbia and was founded to collect, preserve research and display ethnographic and archaeological materials from British Columbia, Canada and abroad (MOA, 2010). MOA is a leading museum in visual storage and is widely known for its extensive Northwest Coast collections and collaborative approach to working with First Nations and other cultural communities (MOA, 2010). MOA's collection contains approximately 535,000 archaeological objects and 35,000 ethnographic objects. The ethnographic materials are derived from all over the world, including the South Pacific, Asia, Africa, Europe, and the Americas (MOA, 2010), and include 6,000 B.C's First Nations objects, 5000 textiles, 3,500 coins, and 4,400 works on paper or made of paper (MOA, 2010). Being part of the University of British Columbia, MOA is also a teaching and research museum that promotes life-long learning, research, collaboration and information exchange with the community who may use the collection for cultural, artistic, spiritual and ritualistic practices (MOA, 2010).

### MOA expansion and renewal project – A Partnership of Peoples Project

In 2006, MOA embarked on a $55.5 million major renovation and expansion project, "A Partnership of Peoples." On January 23, 2010, MOA celebrated the end of the project and opened its doors to the public. The Partnership of Peoples project enabled the museum to increase the size of the museum by 50% and to create new spaces including "new exhibit galleries, visitor amenities, and state-of-the-art educational and public

programming spaces, providing students, scholars, visitors, artists, and community members with unprecedented access to MOA's collections" (MOA, 2010).
The key areas of the renewal project include: 1) The Community Research Suite, consisting of an oral history language lab, research rooms, community lounges, and the Ethnographic and Archaeological Research Suites; 2) The Audain Gallery, a temporary exhibition space for programming and travelling shows; 3) Café MOA and an expanded gift shop; 4) The Reciprocal Research Network (RRN), an open research network that encourages collaborative research between MOA, major Canadian and international museums, and B.C. First Nations communities (MOA, 2010); and 5) The Multiversity Galleries (MVG). The Multiversity Galleries replaced the visual storage spaces and house over 10,000 objects, and location-sensitive information access terminals (i.e., MOA CAT). The MOA CAT is a touch screen digital catalogue system that can be accessed on terminals located throughout the galleries, and present MOA's collections in image, audio, and video formats (MOA, 2010). The renewal project provided the impetus for MOA to enhance its collection management database, which stores information and images of each artefact in the collection and "allows the staff to keep track of where the artefact is, whether on display or in storage" (Maestri & Muise, 2010, p.1). The collection management system now feeds into both the MOA CAT and the RNN.

The renewal project was a multifaceted project that enabled the museum to redesign not only its physical infrastructure, but also its IT infrastructure. This provided MOA with the opportunity to experiment with new ways of implementing and using technology to connect and engage with museum visitors (Museum of Anthropology, 2004, p. 23). For example, one of the components of the project was the Research Enhancement Stream (RES), which concentrated on enhancing MOA's research capacity and leadership in the distribution of electronic cultural knowledge (Museum of Anthropology, 2004, p. 21). MOA operationalized this goal by aiming to develop an integrated and accessible research collection through the provision of user-friendly public interfaces, and an electronic data book and visual storage system (Museum of Anthropology, 2004, p.21). The MOA CAT was designed with the purposes of replacing MOA visual storage books and increasing access to MOA's visual resources and collections. MOA's visual storage data book was created under the premise of opening up the collection to museum visitors by providing access to information about the physical objects that were placed in

the MVG. MOA viewed the design of the MOA CAT as a way to continue the tradition of physical access to MOA's collection through the use of IT that was designed specifically to present information in an engaging and visual format. The following will describe the connection of the MOA CAT within the context of visual storage and the newly developed Multiversity Galleries.

Visual storage galleries often display "a variety of objects of a similar type instead of just a few "ideal" specimens" (Lee, 2009). MOA is a North American leader in visible storage and this is has been a key component of the museum's mandate. In 1976, MOA opened up its collection with the goal of developing new and innovative systems that combine information and visible storage (Lee, 2009) in order to provide direct visual access of MOA's collection to the public for viewing, research and learning purposes (MOA, 2010).

MOA's visual storage collection is arranged according to culture and designed to facilitate visitors' exploration of the collection. For example, the visual storage collection is related to the idea of having a large group and/or several large groups of museum objects on display in clusters, instead of highlighting single pieces from a specific culture within a exhibit (e.g. Ceremonial Masks from various cultures and countries in the world vs. Ceremonial Mask from a specific culture). Prior to the MOA CAT, information on MOA's collection could be found in a printed data book located near the glass cases in MOA's museum exhibit hall (Lee, 2009). The data books, although innovative in the past, were now becoming difficult to preserve and no longer served the purpose they once had in the museum. For instance, when a new object came into the museum, staff had to manually add information about the object into the data books, which was time-consuming. MOA decided to replace the data books with an information technology system within the MVG space, which is now known as the MOA CAT.

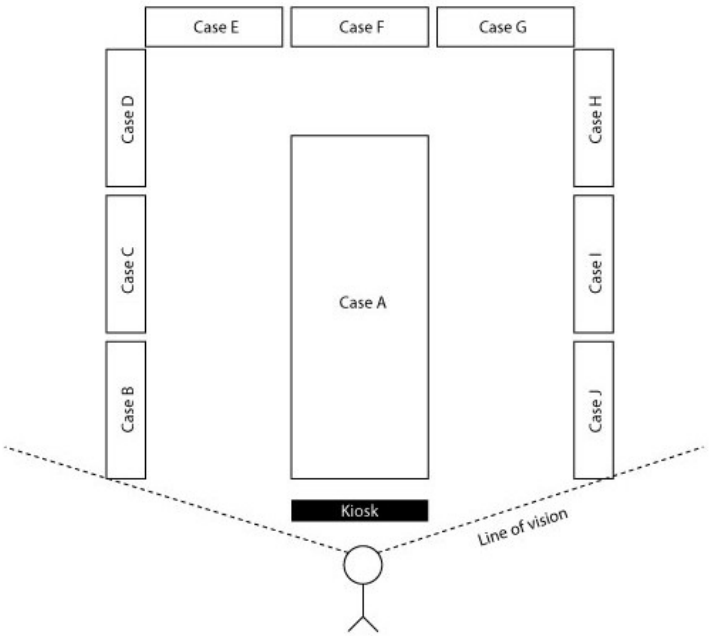
**The MOA CAT system**

The design of the MOA CAT is based on staff-led research gathered over 30 years of working with visual storage at MOA. It was created to visually display and access information about MOA artefacts, and to assist visitors and researchers in experiencing the museum and its collection. The MOA CAT was designed to help visitors navigate through the museum's collection and enable them to explore the collection and/or search for more detailed information about specific objects. It is viewed as "secondary means of exploration and accessing information" where visitors may successfully explore the galleries with or without using the MOA CAT (Maestri & Muise, 2010).

The MOA CAT system is a kiosk-based, touch screen system that provides visitors with detailed information about objects with MOA's collection in the form of text, images, audio, and video. The central idea behind the design of the MOA CAT system was to make MOA's collection and information visually accessible to the public. It was also hoped that, in the near future, MOA CAT would be made available on the Web and thus it was designed with the intention to be used both within and outside of the museum's physical space.

There are 14 MOA CAT kiosks located in the MVG spaces for visitor access and use. Figure 4.1 shows the arrangement of the MOA CAT in relation to the MVG. The kiosks are 24-inch Apple cinema displays with touch overlay technology; visitors press on images, buttons and/or virtual keys to make selections or display an alpha keyboard. The kiosks are strategically located at the "head" of each gallery to spatially orient visitors to the location of the artefacts (Maestri & Muise, 2010).

**Figure 4.1: Example of MOA CAT placement in gallery space**




Source: Museum of Anthropology, 2009.

An “attractor screen” greets visitors with a slide show of images and animations (Maestri & Muise, 2010). The information on the MOA CAT system is fed from MOA’s collection management system and is organized categorically (i.e. Origin, Materials, Time Period, Benefactor, Object use) to make it easier for visitors to search for information aligned with their interests and museum information needs. When viewing an artefact, visitors see the provenance, cultural origins and description of the artefact, as well as images.

**Figure 4.2: MOA CAT interface**


Source: Matthews, 2010

To make the system attractive to a variety of museum visitors, the MOA CAT interface features a simple, yet aesthetic interface design with large buttons and a touch screen. The design was informed though user studies completed by an upper level museum class over a four month period. The resulting MOA CAT interface (see Figure 4.2: interface) consists of a portal page that displays a map of where the visitor is in relation to the rest of the gallery (i.e., “You are here”). The portal page presents the visitor with options to “Explore the Collections” through the following options:

- Explore Globe: This feature enables visitors to explore artefacts by geographic location through an interactive map that becomes animated when a visitor types in the name of a city (See Figure 4.3: MOA CAT interactive map). The concept for this option is based on visitors’ anticipated desire to “see what the museum has from where I come from” (MOA, 2010)
- View by Culture: This option allows the visitor to type in the name of a culture, or to browse artefacts in the gallery by their cultural origins.
- View by People: This feature allows visitors to search by the name of the donator/creator of the artefact.

- View by Location: This option provides the visitor with 3D schematic of the museum gallery, where they may select virtual display cases to learn more about the objects proximal to them. From this view, visitors can see other objects by zooming out to a map of the gallery. From here they can select other regions on the map, and then zoom in to see a 3D rendering of the display cases in the area selected.
- View by Media Type: This feature enables visitors to browse artefacts with images or videos.
- View by Object Type: This option allows visitors to browse by specific artefacts, e.g., masks.
- What's Next? : This option outlines what tours and activities are available or upcoming at the museum.

**Figure 4.3: MOA CAT interactive map**

Source: Matthews, 2010

## Goals of the MOA CAT

In fall 2010, the MOA CAT will launch via MOA's website. The MOA CAT Web version will have most of the functionality of the MOA CAT in the museum space, and will help fulfil MOA's mission to provide information to researchers and the general public. This is central to MOA's goal to break down perceived academic barriers to the museums content. The MOA CAT system was designed to enable visitors to browse and search in different ways (for example, by place, object and location); it was anticipated that this would encourage visitors to experience and learn about the artefacts in the gallery, either through looking up information about specific, known artefacts, or through serendipitous discovery of other parts of the collection. An additional, related goal was to create a system that appealed to people from different cultures and languages. The MOA CAT is object-centric, and thus its design is heavily image-based. Through the use of icons and images of artefacts, it was intended to aid non-native English speakers to use and find information easily. On a more practical note, MOA CAT was intended to be an innovative information technology system that would replace the data books and provide information visually to museum users.

## Summary

MOA's renewal project was launched June of 2006 and completed in January 2010. It involved a great deal of planning around and reflection about the direction of MOA and how the museum should "restore and enhance" MOA's gallery spaces and technology systems. One of the key goals of the renewal project was "to bring behind-the-scenes research forward to greater prominence" (Lee, 2010). This provided an opportunity for the museum to redesign MOA's visual storage galleries and better facilitate access to the collection. The MOA CAT was designed out of this desire to encourage exploration, access, and appreciation of the MOA collection by researchers and the general public (Lee, 2010; MOA, 2010). The MOA CAT system was designed to be integrated into the Multiversity Galleries in order to facilitate quick reference and access to visitors, and to facilitate MOA's transition to more innovative ways of promoting visual storage.

In the preceding section, I set the context for the MOA CAT, its role in the renewal project, and its connection to the Multiversity Galleries and the Reciprocal Research Network. The case study documentation provided information about why MOA CAT was created, the goals it was intended to fulfil, the physical description of the system's interface, and its locations in the museum. However, the documentation did not address the design process of the MOA CAT. How were the goals of the MOA CAT operationalized in the design? How were decisions made about the look and feel of the interface? Who was involved in the process and what did these individuals contribute? Lastly, what challenges and opportunities arose over the course of the system's development and implementation? In order to answer these questions, I conducted interviews with six individuals who were actively involved in the design of MOA CAT. In the following section, I present the findings of these interviews.

**Part two: Interviews**

The documentation of the case study provided an overview of MOA's renewal project and the design goals of creating an IT system that promoted engagement and easy access to museum resources and collections. The interviews supported the documentation data regarding the design goals of the MOA CAT (e.g. accessibility). In addition, the discussion regarding the renewal project provided an opportunity to replace the visual storage data books with a more accessible information system.

Interviews were conducted with an Information Manager, Designer, Project Manager, Communication Manager, Exhibit Designer and Museum Collection Manager. This provided a holistic perspective of the design process from people with a range of expertise who collaborated and negotiated design decisions.

**The design process**

Chapter two outlined and defined public space and stressed the importance of designing information technology that reflects the activities that take place within the public sphere, specifically focusing on museums. The discussion of the design process models emphasized how design goals may shape the design process and the importance of problem solving and thinking through the planning and execution of design goals either

from a prescriptive lens (Simon, 1969; Chunghung, 2008) and/or viewing design as a holistic creative practice (Schön, 1987; Norman, 1988; Catalysts, 2008).

In the following I present the results from the MOA participants interviewed for the case study of the MOA CAT: Information Manager (P1), Designer (P2), Project Manager (P3), Communication Manager (P4), Exhibit Designer (P5) and Museum Collection Manager (P6). Each interview provided rich insights into the design of information technology for the public sphere. The key components of the design process that emerged from the interview data were separated into two key categories: 1. Forming design goals: Research and development; knowledge transfer and shifting paradigms 2. Putting design goals into practice: Opportunity to design; request for proposal; brainstorming and sketching; resources and assets; role negotiation; and collaborating. Separating the data into the formation and execution of design goals provided insight into the thinking regarding the research and key design goals driving the design of the MOA CAT and how this practice may be applied in the actual physical design of the MOA CAT. After discussing the design process, I will focus on the vision, design goals, and the key challenges and opportunities outlined by participants in the design process of the MOA CAT. This data is then linked to participants' discussion of MOA's overarching strategic goals and MOA's renewal project and how information technology may be harmoniously designed and integrated into the MVG space. This analysis contributed a greater understanding of how the design process in a public space is multifaceted and is influenced by the vision, goals and people leading and managing the design process.

## 1. The design process: Forming design goals

### Research and development

The research and development (R&D) phase is an ongoing process that may take place years before the actual design of the technology. Almost a decade before the design of the MOA CAT, the museum staff was aware that they needed something different for people to access information in the visual storage space (P1, P2, P3, P4, P5, P6). So essentially the design team "had years to research things at the museum without really knowing that we were doing research for the MOA CAT system" (P4). During this process they "did not discard anything, until [they] saw what fit and did not" (P4).

The design team had experience in “different areas and all contributed knowledge and ideas into the system” (P4). The research and development was focused on gathering information, yet there was a lot of thinking and questioning: “In the beginning we looked at hundreds of websites and staff spent time research[ing] other institutions and museum’s visual storage collections in North America” (P5). MOA was “interested in seeing how other museums were using technology and allowing access to their collections” (P5). In most instances, other museums were using generic collection management systems that were often put in a separate room or offset area (P2, P4, P5). The placement of technology outside of the space “was something we saw counter to what MOA was trying to achieve, as we wanted some more interactive and more user experience-based collection management system” (P2). After this phase of R&D, and by the time the opportunity to design came to be, “we knew what we liked and what we did not want (P4).

**Knowledge transfer**

The design process within a museum space often starts with the need to update and/or renovate information systems into a more modern system that reflects the mandate and technological needs of the museums. Interviewees expressed the need to replace the old information systems that were in textual form (data books) into a more interactive and visual computerized system. The data books were twenty years old and, at the time of its development, very innovative in the museum world (P1, P2, P3, P4, P5, P6). Similar to the MOA CAT, the data books were placed in the gallery space for public use. However, after twenty years of using the data books and further advancements in technology, there was a great need for a “21st century update” that allowed “people to see a great percentage of the museum’s collection, while also using computers to catalogue the collection and give access to it in a more sophisticated fashion” (P2). The museum staff knew that the data book system had to be replaced and it was already being phased out, “but what was going to replace [it] and what [it] was going to look like was relatively unknown” until the development of the kiosk information systems (P3).

The transfer of knowledge from the data books to the MOA CAT is important because “this information is passed down and used by both the designer and museum” (P2). It was noted that this process was essentially about “the designer building off previously designed information systems with the end goal to improve the system” (P2). The data transfer from text into a more visually interactive system was a dynamic process of transitioning textual information systems into a multimedia platform that incorporated images and video. It promoted more visual ways for museum visitors to retrieve and search for information (P1, P2, P3, P5, P6). This required the museum to share its internal knowledge about how it collects and stores information, and opened up the possibility for other museum technology-based projects to feed into the design of the MOA CAT (P2, P5, P6).

**Shifting paradigms**

Conversations occurred between museum personnel and designers, and user studies were conducted. During this process of knowledge exchange and information gathering, MOA became aware that tacit museum knowledge was not explicitly understood by the public (P1, P2, P3). For example, the user studies involved people who were not familiar with MOA’s collections; this provided MOA personnel with useful feedback for creating an information system that made sense to the general public (P2). Users noted that the museum staff applied anthropological concepts, terminology and information sorting systems that made sense to the museum, but were not common knowledge for the public (P1, P3). This resulted in MOA "thinking differently” about how they distributed their information within the system and to the public (P1). The transfer of knowledge between the museum and people outside of the museum’s internal structure was a valuable experience, as it forced MOA to revaluate and reassess how museum information was being created with respect to how it would be retrieved and used within the museum (P3).

## 2. The design process: Putting design goals into practice

### Opportunity to design: Funding, staff and time

Museums, art galleries and other cultural facilities that serve the public want to develop new information technologies, but are often held back due to lack of resources, time, people and skills (P2). For example, the ability to hire outside design expertise (e.g. professional designers) and/or pay for extra staff time is a costly endeavour that many publicly funded institutions cannot afford (P1, P2, P3). Although museum staff knew the data books needed to be replaced before the announcement of the multi-million dollar renewal project in 2006 (P1, P2, P3), they had been unable to put their plans for a new information systems into action. The renewal project was based on "creating new spaces and expanding the gallery space and research infrastructure" (P3). Part of the project was the Multiversity Gallery (MVG), which provided an opportunity for the museum to re-design its public information systems according to the renewal project's mandate. Thus, this new development provided MOA with the opportunity to replace the thirty-year-old visual storage data books that were viewed as outdated (P1, P2, P3).

### Request for proposal

Once MOA staff knew they had the support and people for the design of the MOA CAT, they sent out a request for proposal (RFP) (P2, P3, P4, P5). The RFP defined MOA's wants, questions, needs and what they requested from a designer (P2, P4). The "proposal was well laid [out], as we wanted to attract designers that were on the same wavelengths as MOA" (P4). Luckily "we found the right designer who reflected our needs at MOA, a design professional within museums, [who] was very flexible and created a system that was very adaptable" (P5).

After the designer was hired, he was invited to the MOA space and met the museum team (P1, P2, P3). This phase of the design process involved collaboration and information exchange between the designer and MOA staff in order for the designer to evaluate MOA's design goals, skills, and resources and understand the content of the intended IT system. Once the designer had this initial information, collaborative work could begin on the design plans for what became the MOA CAT system.

**Brainstorming, sketching and storyboards**

In the beginning of the design process, brainstorming sessions took place to reach a common understanding about the visual appeal and search capabilities required in the system (P3, P5, P6). “Some of the ideas may have changed over time,” yet the initial brainstorming ideas can still be seen in the design of the MOA CAT” (P6).

**Resources and assets**

The designer and museum staff were required to evaluate the types of resources and assets they had within the museum to avoid expending effort and money unnecessarily. Some questions the design team asked itself were: What already exists and how can it be used in the design? What skills do people have in the design team and how can they best be utilized? How can other projects, ideas and information be used in the design of the information system? (P1, P2, P3). These questions helped determine what could actually be accomplished given the resources and time available to complete the design of the information system (P1, P2, P3, P4, P5): “We wanted to make sure MOA could leverage some of the work we were doing on other research projects and apply “our digital assets within the design of the MOA CAT system” (P5).

Developing information systems requires resources - money, people, and time (P1, P2, P3, P4). It involves understanding “that some things just can’t get done” (P3) and “work[ing] with the museum’s vision “to assess “what you can actually do and get done realistically” (P1). The interviewees noted that it’s important to work with the assets available within the museum. Before the design of the system began, “the design team assessed what resources they had available to them so people won't have to redo work” (P2). Key assets were identified as the MOA collection management database, MVG 3D design drawings, and museum volunteers and university students capable of assisting with user testing. In addition, the museum combined projects associated with the renewal project when possible, re-used materials and resources (P2), and drew upon people within their network - volunteers, museums studies students and research experts (P1, P3, P4) - to conserve resources yet still inform the project.

It was also essential to design a flexible system so that when more resources become available the system could continue to be improved upon (P3). The system needed to fulfil “the specific function” that it was designed to do; yet “you have to stop at some point and move on” (P1). Thus interviewees described the importance of “put [ting] some boundaries around what you are trying to design, so you are able to control the scope of what you are designing” (P3). The amount of time and resources available helped to create these boundaries and separate notions of “this would be fun, this would be nice to have, [and] wouldn't be great if it could do this from what needs to get done” (P3).

**Role negotiation**

Each member of the design team had a specific and different role to play within the design process. Some of these roles were well laid out and understood prior to the initiative of the MOA CAT project, while others emerged and become more defined during the design process (P1, P2, P3, P4). Responsibilities included: determining the look and feel of the MOA CAT, data collection and management, communication and website design, programming, project management, and connecting team members (P1, P2, P3, P4, P5, P5, P6). Some individual’s responsibilities shifted during the course of the design process, and some were more prominent during specific phases of the project (P1, P4, P5).

The designer and project manager were seen as leading forces in the design process in terms of organizing and implementing the museum’s ideas into practice and action. The project manager liaised with and facilitated communication with designers and the museum staff working on the design of the systems (P1, P2, P3). The designer oversaw the designing, programming and delivery of the whole system from the software point of view, including graphic design and interactivity (P2, P3). This involved supervising workers external to the museum, such as programmers (P2). While the museum staff had to communicate with only one designer, the designer himself had a small team that worked on the hardware and programming of the system, in addition to other key tasks performed by museum personnel which included collection management and sorting information for the system (P6).

**Collaboration: Working together towards a goal**

Collaboration was key during the design process. It was accomplished through ongoing meetings between the design group and main system designers, either with everybody, one-on-one, or within small groups (P2). It became an ongoing process where the key designer came back to the group to discuss prototype development and design planning that came out of previous meetings. The meetings included establishing clear objectives for the system, getting to know one another, which facilitated building relationships between the designer and museum staff, ensuring that everybody's role within the deign process was being incorporated and understood, and that people felt part of the system (P2, P3).

The makeup of the design team (i.e., collection manager, information manager, designer) resulted in "a number of people bringing their expertise and knowledge to the table" (P1), yet also a different approach to how artifacts needed to be organized to fit within the museum space and MOA CAT (P1, P2, P3, P4). While everybody may have approached the project with a certain mindset and field of expertise, there was an understanding that people had to work together to design a kiosk information system that reflected the whole museum and "got the job done" (P2, P3).

Key to the collaboration approach was having a "go to" person(s) within the museum; this individual essentially managed the design project and was able to liaise between the designer and the museum team (P4). Having this one-on-one contact was important, as this person was capable of communicating the ideas of the museum personnel to the designer, and, in turn, the designer's ideas to the museum team (P2, P3, P4). This is not to say that there were not design meetings with everyone in attendance, but during the process it was difficult to have everyone at the table at all times during the design project (P2, P3, P4, P5).

The collaboration between the designer and museum personnel involved an understanding that the designer was in charge of the look and feel of the system and, in some ways, the functionality (P1). This designer worked from the vision of MOA and museum staff knowledge (P1, P2), and it was the museum's responsibility to effectively outline its vision, mandate and the MOA CAT's look and functionality (P1, P2, P5). The

museum provided the designer with “broad stroke ideas” and gave him creative flexibility with the knowledge that some of MOA’s ideas and criteria were very concrete and well outlined, while others were more flexible (P1, P4).

A design team comprised of people from different backgrounds made the design process challenging, yet also dynamic (P1, P2, P3, P4). One interviewee said, “you have the design person saying you need to do “a”, “b” “c” and “g” and it needs to be like this. Yet, you will have the collections manager saying that you have to have “h”, “j” and “i” and than you have curators saying you can’t do “i “because of these key reasons” (P3). It required effort to sort through the diverse knowledge base within the museum, and for the designer to examine and prioritize various needs, and recognize the perspectives of those involved: “The mixture of the design group and expertise relies heavily on people’s comfort with design, their skill set and trying something new – while at the same time being busy with their own work load and responsibilities at the museum” (P3).

The success of the information design process was seen as being tied to how well the team was able to gather data and images for the system. Having this prepared before the design process began was key, as it was noted that data sometimes could be messy and take time to prepare. Having everything well organized and detailed was viewed as essential to the success of the kiosk information system (P1, P3).

**The design of the MOA CAT: Vision, challenges and opportunities**

**Vision and goals of the design**

The interviewees highlighted how the vision and goals of the MOA CAT were negotiated and managed throughout the design process. Interviewees stressed that the museum was object-based and thus there was a need to design a system that enabled people to explore the museum’s collection visually through multiple mediums and ways of knowing (e.g. images and video) (P1, P2, P3). This helped to define the look, feel and design of the system (P2) and was translated into the design of the museum’s kiosk information system according to the ideas of a) ease of use, b) fit within the physical museum space, c) visual presentation of the MOA CAT system, and d) design for the future.

**Ease of use**

The MOA CAT design team endeavoured to create a system that would "engage visitors, include the voices of people, and allow for an effective way of getting access to information at MOA" (P1). It was important to design an information system that not only displayed information about the museum's objects, but also how to find them within the museum space (P1, P2, P3, P4, P6). Easy access to the terminal was highlighted as a key goal and required the design team to discuss the location of or best spots for the MOA CAT kiosks in the gallery space (P1, P2, P3, P4). Participants discussed the importance of designing a system that took you where you wanted to go, but also introduced other aspects of the collection: "If you found something interesting, the systems was designed to give you the option to find out more about it" (P3).

Yet the system had to be more than just a means of finding information; it had to be dynamic and interact with the public (P3, P4). MOA wanted the system to be visually appealing and inviting, so that "people would say 'what's that?' and want to explore it further" (P4). Visitors should be encouraged to take various journeys though the museum and the MOA CAT – to look at objects and learn about things that they did not intend to find - and to explore objects and collections of specific interest (P3, P4). For example, if visitors found an object they were are interested in, they could use the systems to search though the collection and find other items from the same time period and/or culture (P4, P6). The vision behind the design was to make it a "seamless experience" where "standing in front of the museum case was similar to standing in front of the computer" (P3, P4). For instance, the "You are here" function enabled visitors to locate themselves within a 3-D rendering of the museum, which helps the visitors "explore the space around them virtually and in the museum" (P4). It was felt that this would encourage people to look around the museum and give them the choice to either go to the computer to find information about the objects, or to see an object in the museum and go to the computer and find more information about it (P2, P3, P4).

**Fit within the physical museum space**

The kiosks were intended to be part of the exhibit, yet not dominate the space. The kiosks were placed in the space to promote use and access to information, yet visitors should not need to use a kiosk to enjoy the museum space and/or collection (P2, P3, P4). The MOA CAT should complement the museum's objects by providing information and alternative ways for people to find information (P1, P2, P3, P4).

One interviewee stated that "design is not just the look and feel [of] how the user interacts with the system, but how the design of the system sits and feels in the gallery space" (P3). The integration of the kiosk system and the MVG space was a key design priority (P2, P3). It was important that the MOA CAT reflected how people "experience the museum space in the real world" (P5). The exhibit designer discussed how people generally experience the museum collection though visual and physical cues (visually seeing the object and/or pointing at the object to show others): "the touch screen computers enables users to look at the object, touch and view information" on the MOA CAT - very similar to how people explore the collection within the gallery space (P5). MOA also wanted the kiosk interface to be more tactile and for people to feel they were reaching in and touching the objects directly".

In order for the MOA CAT to fit within the space, the design team did not want the MOA CAT to be just a "computer and/or kiosks"; they wanted the MOA CAT to be seen as a "museum object within the MVG" space (P4). They designed the MOA CAT to be seen as more of a "digital library, than a computer system" within the MVG space (P2). To accomplish this, the design team decided to "strip way all things that made it a computer such as the keyboard and mouse" (P4); giving it the same look and feel of the gallery space (P2, P5). The team also considered the colours and fonts that were going to be used for signage within the gallery (P2), which was designed to be "very contemporary, clean and elegant. This became an inspiration for choosing the Apple touch screen monitors" to reflect the feel and look of the gallery space (P2).

MOA also wanted to have “live data within the gallery space” (P4, P6). The renewal project provided an opportunity for the museum to create tracking systems for all the objects. “The tracking systems enabled the way to digitally track the objects and match them to where they were located in the space” (P4). This was seen as an innovative move for the gallery space, as you can search for objects that you see directly in the space and have access to the MOA database to find out more about the object (P1, P2, P3, P4, P6). Allowing the data to be displayed and distributed in this way was seen as democratizing access to MOA’s collection (P2, P4, P6).

**Visual presentation of the MOA CAT interface**

The “look and feel” of the system was an important design element. The system had to “look elegant” and the museum wanted “something interesting and graphic” (P2, P3, P4). They did not want a computer in a box; they wanted the information system to fit within the gallery space (P2, P3, P4), hence the touch-enabled Apple monitors (P1, P2, P3, P4).

MOA also wanted to design something inventive (P5), so the resulting “you are here” function was viewed as a really innovative function, as this was not seen anywhere else (P4, P5). “To us and hopefully to others this made the MOA CAT system very innovative technology in Canada” (P5).

Another goal associated with the visual presentation of the MOA CAT was that it should be usable by non-English speakers (P1, P3, P6). Interviewees highlighted the need for a “language agnostic” system that could be used by visitors. Visitors should not have to be English speakers to navigate and find information on the kiosks system (P1, P3, P4, P6).

**Design for the future**

“Design for now, but also for tomorrow” was a common theme in the creation of the MOA CAT (P2). Participant 3 described this as building a system in such a way that “it’s perfectly feasible in the future to upgrade to the multi-touch monitor and modify other parts of the systems” (P3). It was also discussed that the design of the MOA CAT should be aligned with upcoming computer trends, such as touch screen technology and iPad technology (P2, P3, P5). This required the design team to have foresight about the

technology that was coming into the public's use and how it would be received and used by the public (e.g. iphone/ipad http://www.apple.com/ca/) (P2, P3, P5). For example, it was noted that during the time the kiosk was being developed "the iPad did not exist yet, but we knew it was coming" and this helped them in the design of the touch screen kiosk system (P5). The information system built on other technologies, such as Google Earth (http://earth.google.com/); tying in this external, widely used program was seen as a way of using a polished system that the public was already familiar with (P5). It was noted that there are many other features that could be added, but, due to time and finances, the museum was unable to add these into the system. Yet, the system was designed to be flexible so new features/applications could be added in the future and the MOA CAT could incorporate new technological elements (P2, P3, P5). For example, the future goal of the kiosks include being even more interactive though images and videos. It was also mentioned that future plans for the MOA CAT included connecting it to MOA's website and, potentially, mobile technology (P1, P2, P3, P5). Overall, it was understood that technology is constantly changing and that the system needs to be flexible to incorporate new elements (P2, P3, P4, P5).

**Challenges**

The development and implementation of MOA CAT was not without its challenges. These challenges pertained to 1) issues with technology; 2) resources; 3) displaying information via the interface, 4) language agnosticism; and 5) ownership of the MOA CAT system.

**Challenge 1: Leveraging the limitations of outside systems**

The ability to ensure the MOA CAT "worked seamlessly" (P4) with other museum systems was a key challenge (P1, P2, P3, P5, P6). The design of the MOA CAT required people from different parts of the museums to share data, and for data to be transferred from other information systems into the new kiosk system (P6). The design decisions about the type of technology used for the MOA CAT impacted how the museum organized its information and migrated data into the new system (P5, P6). One interviewee noted that, although this was a challenge, the museum staff were able to "push data in ways that I did not think was possible" (P6).

The creation of an automated process that was able to read data and then in turn connect it back to Google Earth was discussed as one of biggest challenges in the design process (P1, P2, P5, P6). Google Earth was key to the MOA CAT system because it highlighted the geographic locations of museum objects, among other applications (P6). This required the museum to collect, organize and transfer data that easily connected to the Google Earth system, which was a timely and difficult process (P1, P2, P3, P5, P6). For example, the "data needed to be clean and well organized", if something "did not line up it did not work on the Google Earth" (P1, P6). Another challenge regarding Google Earth was that it was time consuming, as it required data for every entry, for example finding longitudinal and latitudinal data for all the objects (P2, P6). Some things were "easy to find", yet others were hard to locate on Google Earth - "particularly because our collection is spread all over" (P6). For example, "a small little village on the Pacific is not on Google Earth, so we had to do our best concerning that Google Earth is still a limited system, particular regarding finding names and locations of remote places" (P6). It was also noted that using an outside system can bring about challenges. Participant 2 noted, "Ultimately the museum is at mercy of Google, as Google Earth can be updated at anytime and this can negatively impact what the museums has done (P2). You can use an outside system, "but be aware of the trouble it may bring since it introduces an element into the internal system that is that is "slightly out of our control" (P2).

The MOA CAT was designed to be visual and interactive, which required translating and organizing the museum's image collection, consisting of over "79 000 images, which required creating millions of derivatives into the MOA CAT" (P6). To overcome this challenge, tools needed to be built to manage the images within the data management systems; the design team quickly realized that what worked in one area did not necessarily work in another (P2, P6). For example, once the format of the systems was decided upon for the images, the images often needed to be formatted in order for them to fit into the system. The same could be said for the use of video. It was noted that although this had to be done and was worth taking on to make the systems visual and interactive - making everything connect and fit within the MOA CAT system was a challenging and timely effort for the museum to take on (P1, P2, P3, P5, P6).
Lastly, it was also a challenge to use a MAC system and computer, as before this MOA was predominantly a PC system user (P4, P6).

**Challenge 2: Maintaining commitment**

*It was a lot of work, but we were all happy to see it at MOA* (P6)

Maintaining a design process takes time and money. Having enough time and the resources to complete the MOA CAT was a major challenge. It was noted numerous times that "the system was never done" (P3) and the possibilities for the system were endless (P1, P2, P3, P5, P6). One interviewee stressed, "something really important that I want to get across is that, depending on how much time and money you have, there is a limit to how much you can do and you have to accept this to be the case in the design process" (P3). Thus, you have to be "able to put boundaries around what could be accomplished" with the time and resources available (P3).

Time was also a major challenge as everybody working on the design of the MOA CAT was busy working on an array of different projects (P1, P2, P3, P4, P5, P6). Thus, very few people had time to dedicate solely to the development of the kiosk system. This is not to say that the MOA CAT was not important; this was "simply the reality of working within the small museum (P1, P2, P3, P5). The kiosk system was completed "because people saw the importance of it and dedicated time to it" (P3). This required people in the museum to say, "yes we can do this" (P3). For example, the design team agreed that the interactive map feature was worth doing, even though "this took weeks of work" (P1, P2, P5, P6). Thus, before embarking on certain aspects of the project, the design team had to evaluate if it was worth spending time on immediately or if it could be done at a later date (P1, P2, P3, P5).

**Challenge 3: Privileging voices**

The key goals were to make the kiosk system dynamic and visually appealing, and to transfer knowledge and information from the old information system into a new format that could be easily understood and used by the public and the museum (P1, P2, P3, P5, P6).

The challenge was in how to use visual information to inform the public about the objects and where to place this data (P1, P3, P5, P6):

> *I was hoping in the original idea that the community voice in video or whatever would be quite prominent - now you have to hunt for it. It's there, but it's not upfront. I think that's a design challenge, what you're privileging up there over others (P1).*

Deciding what was more present and upfront in the system compared to other pieces of information was difficult, since everyone had different perspectives on what should be most prominent, but these priorities took time to discover (P1, P3, P5) and there are "multiple ways of knowing and finding information in the museum" (P1). Sometimes the information that was privileged was simply what content was ready at the critical point in the design phase (P1, P2, P5).

It was noted that organizing the museum data in different ways would be an ongoing challenge. Although the museums have taken broad steps organizing information with the public in mind, it still falls short in some areas (P1, P5, P6). For example, one of the disputes cited in working with the data was that it was layered with anthropological concepts and ideas that made sense in the museum world, but not outside it. This required the museum to repurpose the data and work with various people to organize the data in ways that "made more sense to people who may not be an anthropological or museum person" (P1). Essentially this meant that the museum had to take its "anthropological goggles off and work with the public" in order to make the MOA CAT more "intuitive for the public person to trying to find things" (P2). This also meant that MOA had to listen when the kiosk system designer and others not familiar with the museum structure pushed back at the ideas of MOA employees. "This push back was helpful as it reminded the museum that we are embedded in concepts that make sense to us, but may not make sense to the public (P1).

Lastly, interviewees stated that it was difficult to create systems that would meet all visitors' needs. The museum, for example, is a home for the researcher as well as the tourist, and these individuals may have different user needs and expectations. The systems are touch screen and have no keyboard, thus "you cannot do Boolean

searches, which was a immediate frustration for researchers used to the old system and who, for example, were familiar with anthropological concepts and usually had a specific interest in mind to search for" (P1). This brings an interesting challenge of trying to blend traditional usage of museums into new ways of knowing and finding information that accommodate researchers, museums and the general public (P1, P5, P6).

**Challenge 5: Language agnostic**

Museum knowledge is very object based; how this information was translated and organized into the kiosk information systems was difficult. One of the objectives of the system was to move away from text and make it language agnostic through the use of images and icons (P1, P2, P3, P4, P5, P6). However, this was "more difficult to achieve than anyone realized" (P3). For example, "MOA's database was, as other similar museum databases in North America are, very English-language centred" (P6). In the case of the MOA, all of the data that feeds into the MOA CAT is predominantly in English, making it difficult to add new languages and make it more culturally accessible (P6). To overcome this challenge MOA used touch screen technology, images, voice and videos as viable alternatives to make it more accessible to non-English speakers (P1, P2, P3, P5, P6)

During the beginning of the design process, the design team experimented with the use of icons, instead of text. The design team tried creating an "icon instead of words, [but] then you look at the icon and you realize it's not clear what the meaning was." Furthermore:

> *Some icons are universal, such as woman and male washroom signage, yet for so many other things there isn't an icon that is clear and easily understood by the public (P3). For instance, what is the icon for ceremonial objects? Once we started down this path and explored the use of icons, we realized that we can't really use icons and had to figure out different ways to organize the information (P3).*

Although the design team wanted the system to be cross-cultural, it is still very English-based. Thus, building an information kiosk system that can be easily adapted by different cultures proved not to be an easy task (P1, P3, P6).

### Challenge 6: Negotiating ownership & sustainability

Collectively a museum has many different components. It was acknowledged that due to the diverse nature of the museum, it was difficult to determine who was going to own the system and take care of it after it was finished (P1, P3). The challenge of collaboration was that people came with their own ideas and perspectives, such as project management, IT, design, communication, website design, and collection management (P1, P3, P6). This was difficult because everyone was working in their own domains and had separate responsibilities during the design process (P4). Thus no one really "owned" the system, and MOA struggled to determine whom the right person or museum unit would be to drive the kiosk information system forward (P2). Currently, the MOA CAT system has now moved into collection management hands (P6).

### Opportunities

The opportunities of the MOA CAT system were viewed as "limitless," but would depend upon people working within and outside of the museum to form partnerships that would move it forward into new domains, areas and applications (P1, P2, P5). One current development is the launching of the MOA CAT via the museum website to enable people to "identify things that they wanted to see and create a tour for themselves, as well as have the ability to go back to the website and comment on what they seen and share that with their friends" (P1, P3, P5). It was the hope that by connecting MOA systems and projects, museum visitors would be able tag data, find and save information, interact with objects, and promote an ongoing dialogue with the museum (P3, P5).

Further opportunities mentioned by interviewees included:

1. Pushing the kiosk data into handheld devices (P3, P6);
2. Connecting the systems to other projects being developed, such as the Reciprocal Research Network (RRN), the online community research hub (P2, P3 P5);
3. Linking the system with education and programming in the museum. For example, enabling educators to use the kiosk systems and the online format to plan visits and activities for school visits or classroom lessons (P3, P5).

**Summary**

This thesis research sought to explore the different aspects of the design process in the public sphere, specifically a museum. The case study data provided context for examining the design process of designing an IT system in the public sphere and sought to provide a better understanding of the expectations, decisions and vision of the team developing the MOA CAT. It investigated such questions as: What were the design goals and trends of creating such a system? Who was involved? What were the challenges and opportunities?

The documentation data provided a broad overview of the renewal project and design goals of the MOA CAT. It also discussed the MOA CAT in terms of providing access to an innovative system within the gallery space. The interview data concentrated on the design process, goals, challenges, and opportunities. It illustrated that the design of the MOA CAT was a longitudinal process that required participation and input from many collaborators.

The key components of the design process that emerged from the interviews were 1) Forming design goals: Research and development, knowledge transfer and shifting paradigms, 2) Putting Design Goals into practice: Opportunity to design, request for proposal, brainstorming and sketching, resources and assets, role negotiation, and collaborating.

The interview data illustrated that the design of an IT system in a museum is not a step-by-step process. It requires participation and input from many people to design an information system, as it has to be many things to many people working and using the MOA CAT system. The data also identified the design process of the MOA CAT system as a fluid and organic process that still continues today.

In the following chapter, I will examine the findings of the case study and discuss how it is related to the literature reviewed on the design of technology in the public sphere, concentrating on museum spaces and the design process. These include the Rational Problem-Solving process (Simon, 1969) and reflection-in-action paradigms (Schön, 1983), the Gulf of Execution and Evaluation model (Norman, 1988), and the Museum of Science and Discovery Centre (DCWS) model (Chunghung, 1998). I will conclude by discussing the design process from an organizational perspective and outline negotiable and non-negotiable constraints.

# Discussion

The MOA CAT study was created to explore the design process and to, document the practitioner based practices and viewpoints around developing an information system for the public sphere. The production of an IT system in the public sphere is a multifaceted process that involves the formation of goals and staff expertise in diverse areas, and collaboration to push design goals into a working IT system.

In this chapter, I will first focus on the design process inherent in the case study results specifically those introduced in Chapter 2. Secondly, I will outline the MOA CAT design goals and how they may help shed light on the design process in the public sphere. The design goals demonstrate that practices and thinking driving the design process in this particular setting and how organizational mandates and diverse expertise shape these goals. Third, I will discuss the importance of collaborating with others for the purpose of accessing resources, defining staff roles and executing design goals. Lastly, I will emphasize the need to design IT systems that reflect the activities that may take place within a public space and the challenges and opportunities that may exist in the design of an IT system for the public sphere.

### Revisiting the design process models

In Chapter two, I reviewed three key perspectives and four design process models: 1) design paradigms: Rational Problem-Solving process (Simon, 1969) and reflection-in-action paradigm (Schön, 1983); 2) step-based models: the Gulf of Execution and Evaluation model (Norman, 1988) and the Museum of Science and Discovery Centre (DCWS) model (Chunghung, 1998); and 3) negotiable and non-negotiable constraints. Simon's Rational Problem-Solving process and Schön's reflection-in-action paradigm discuss the approaches a designer may apply in solving a design problem(s) from both a constructivist and positivist perspective, respectively. Norman's (1988) Gulf of Evaluation and Execution model may be applied to better understand the gaps of information and

knowledge that may exist in the design process (Norman, 1988). Chunghung's DCWS model summarizes the design of a museum exhibit from a prescriptive and managerial lens that incorporates such things as work plans budgets and contracts. Lastly, the discussion of negotiable and non-negotiable constraints provides context regarding how design goals are evaluated and negotiated throughout the design process (Catalysts, 2009).

**Comparison: Design process models vs. case study of the MOA CAT results**

Dorst and Dijkhuis (1995) argue,"there are many ways of describing the design process," as the practice of design is influenced by a range of factors and disciplines (p. 273). The design process models outlined above provide insight into different areas of the design process. Yet, no one model fully describes the design process of an IT system in the public sphere. In particular the design process models discussed in the literature review fail to address:

1) The types of design activities that take place before a product is designed and/or integrated within a space (e.g. research and development and opportunity to design);

2) The situations when there is not just one designer making design decisions, but rather a shifting/changing group of people working collaboratively on a design. For instance, one of the underlining themes of the MOA CAT case study was the importance of collaboration between staff and the designer – essentially working as a design team; and

3) The methods for keeping track of the challenges and opportunities that may arise during the design process. For instance, the results indicate that managing resources and assets, shifting paradigms, role negotiation, staff collaboration and other unforeseen factors may positively and/or negatively impact the design process of IT in the public realm.

There are, however, components of the design process models discussed that are reflected in the MOA CAT design process. For example, Schön's (1983) reflection-in-action paradigm and Norman's (1988) Gulf of Evaluation and Execution model view the design process as a reflective and creative. The case study data emphasized the desire

to produce an innovative and flexible technology capable of engaging visitors now and in the future. Simon's (1969) Rational Problem-Solving process and Chunghung's (1998) DSWS model view the design process as a prescriptive one. This was evident in the overall management of the project; and the need to bring in expertise at specific times and to have content such as images, ready for input. In addition, there were features and functions deemed essential, while others would have been nice to element. These items were checked against financial and staff resources to determine what could be done and in what order. The case study of the MOA CAT has shown that the design process of IT in a public space is a human-led process that is fluid and changeable. Yet, there are elements of the design process that may be seen as prescriptive steps such as the need to develop a request for proposal, budgets and contracts.

The application of negotiable and non-negotiable constraints is also helpful in providing context on the design process from a practitioner-based lens (Catalysts, 2009). For example, the case study of the MOA CAT demonstrated that the design process is largely driven by the creation and execution of design goals. Yet, similar to other models, negotiable and non-negotiable design constraints fail to address the human and collaborative components of design, such as how design goals are created and adapted throughout the design process.

I argue that no one model can fully address the complexities and richness of the design process of an IT system in the public sphere with all of its different components, people and practices. The design process may be best understood through the application of multiple design models and gathering information from multiple perspectives on the design process. The application of design models that balance creativity and innovation with organizational and situational constraints and goals. Existing design models should incorporate ideas of collaboration to provide a richer understanding of the design process in the public realm. Given the diversity of public spaces (e.g. museums, libraries, parks, etc.), the technological needs and goals of the space, the users, and the range of resources and expertise available, it is difficult to advocate for any one model.

However design process models give us a framework, a “tool box” from which to begin and build the design process, and organizations that have been through the design process give us examples and “lessons learned” that may be applicable to other public spaces. Therefore, it is important to document the design process and enable public organizations engage in dialogue around the design process.

In the following, I will discuss the design process in more detail by describing the design and planning of the MOA CAT system and highlight areas of the case study data that may add insight into the design of an IT system in the public sphere. I will first describe the process of forming design goals.

**The formation of design goals: Thinking, practices and processes**

The initial phase in the design process often involves the formation of design goals (Norman, 1988; Chunghung, 2008). According to the Rational Problem-Solving process (Simon, 1969), the application of design goals may involve the designer following a well laid out plan and/or series of prescriptive steps. The reflection-in-action paradigm demonstrates that the process of problem solving may take on more holistic approach that is largely informed by the experiences and practices of the designer. Norman’s (1988) Gulf of Evaluation and Execution model discusses the formation of design goals as a way to help frame the design process, as well as how to evaluate the design after its implementation and use within a space. In contrast, Chunghung’s (2008) DCWS model outlines the development and execution of design goals as a prescriptive process where design goals are constantly managed and evaluated by museum staff during the design process. For instance, Chunghung outlines how design goals may be used to help create a request for proposal, design budgets and staff contracts. At the practitioner level design goals are seen as either negotiable (design goals that can be adapted and changed) and/or non- negotiable design constraints (design goals that are not flexible and ideally must be achieved) (Catalysts, 2009).

The design goals of an IT system in the public sphere should ideally reflect the values and activities of a space in which it will be used (McCullough, 2004; Messeter & Johansson, 2009). For example, IT systems designed for the public sphere should be easy to use, accessible and break down social, cultural and economic barriers to

information in the public sphere (Hornecker & Stifter, 2006; McCullough, 2004). In the case of the MOA CAT, the design goal of formatting the system was to break down academic barriers to information in the museum (MOA, 2008). The initial design goal that drove the development of the MOA CAT was MOA recognizing the need to replace its aging visual storage data books. In the 1970's the visual storage data book was created to help make MOA a leader in visual storage by the democratization of its knowledge and breaking down barriers to information. The values of visual storage that drove the design of the data books were the same values that led the design of the MOA CAT system, i.e., breaking down academic barriers to information, and being easy to use, flexible and innovative.

Yet, how are design goals such as accessibility, flexibility and innovation designed into an IT system for the public sphere? In the case of the MOA CAT, accessibility was measured though the system's ability to: 1) be easy to use; 2) enable users to explore MOA's collection in various ways and forms; 3) be easy to locate and use in the MVG space; 4) be wheel chair accessible; 5) use various kinds of audio and images to help users search through information; and 6) be used by museum visitors from diverse cultural and language backgrounds. The interview data demonstrated that, although a majority of the design goals were met in the design process, the design goal of creating an accessible IT system for a public space was difficult to achieve even when an organization has the appropriate technical skills, knowledge and experience. For example, the interviewees generally viewed the system as accessible and easy to use in the MVG space. Yet, they emphasized that the MOA CAT is not as accessible as they originally envisioned in the beginning of the design process due to the system not reaching their initial design goal to design a fully functional language agnostic system.

The design goals of flexibility and innovation were also highlighted as key design goals in the results section. The interview participants stressed how important it was that they used the latest technology, such as touch screen technology, had the ability to connect to MOA's website, kept the IT system open to new technological functions in the future, and had the ability to partner and/or connect with other IT systems/projects at MOA (e.g. RNN project). Thus, the design of an IT system that is adaptable to organizational change and new technological directions in the public sphere may be a key component for keeping a system flexible and innovative (McCullough, 2004).

In summary, the case study results indicated that the key design goals driving the design process of an IT system in the public sphere may include creating an easy to use, accessible and flexible system. The results of the interview data revealed, however, that incorporating these goals into a design of a working IT system is a difficult and ongoing process that needs to be managed once the implementation of the system is complete. In this specific case, the final design and successful implementation of the MOA CAT in the MVG space was attributed to how well the MOA design team collaboratively worked together. In the following, I will discuss how the execution of design goals is dependent on collaboration, the ability for people to play multiple roles in the design process and the importance of accessing recourses and staff skills.

**Putting designs goals into actions: Collaboration and defining roles**

Collaborating with others in the public sphere is valuable in the public sphere, as it is often viewed as a space where knowledge and experiences are shared with others (Landry, 2000). Yet, the four design process models often focus on the skills and practices of an individual designer, rather than a group of people collaboratively working together on a design of a IT system (Simon, 1969; Schön, 1986; Norman, 1989; Chunghung, 1998). In design literature, collaboration is often discussed in terms of designing a system that enables users to collaborate with one another and/or the need to work with users in the design process (e.g. participatory design) (Smith, Vega & McCrikard, 2008). Thus, there may be a lack of analyses on the value of collaboration and the relationships formed within the design team in the case of IT systems developed for the public realm. In addition to the diverse skill set(s) people may contribute to the design of at IT system, more evaluation and understanding of how people collaborate and view the design process in the public realm may provide better insight into the practices, skills and decision making that take part in the design process.

Some questions regarding collaboration in the design of an IT system in the public sphere may consist of: 1. *What types of staff roles exist in the design process of IT system in the public sphere?* The MOA CAT case study data indicate that having a project manager was viewed as essential in coordinating and managing the design of an IT system. It was also stressed by participants that the design team played multiple roles; this was viewed as both an asset and challenge in the design process. 2. *What*

*types of skills/expertise are deemed valuable in the design process*? Some of the skills mentioned in the case study of the MOA CAT included communication, information organization, design and research. It was also stressed by participants that the MOA CAT design team was a mix of people who had pervious knowledge about design from curatorial, Web and industrial design perspectives. *3. How do people on a design team collaborate on the design of an IT system in the public sphere?* The interview participants noted that communication through regular meetings, the fair division of work tasks, and a shared understanding of why design choices were made over other possibilities were key to facilitating a collaborative design environment.

Asking these types of questions regarding collaboration and the design process illustrate that the production of IT in the public sphere may consist of series of tasks that are led and accomplished by various people depending on their skill set and role in the design process. An example of collaboration was the design and use of Google Earth in the MOA CAT system. Google Earth was noted as being a key design challenge due to the amount of staff time and energy it took to complete. The process of gathering data for Google Earth required staff with expertise in information management, design and knowledge about using third party systems such as Google Earth. Google Earth, in many respects, was able to be designed into the MOA CAT because members of the team were able to streamline and organize data. Second, the MOA CAT design team collaboratively agreed that this was an important function and worth spending time on and working towards. Lastly, the designer intentionally developed the MOA CAT system to be flexible and work with outside systems such as Google Earth.

In summary, the MOA CAT case study demonstrates that the formation and execution of design goals is a collaborative process, which may involve staff members with diverse skill sets, knowledge and expertise. Accessing resources and defining staff roles, was also stressed as an important area of the design process. In the following, I will discuss the execution of design goals and stress the important role space plays in the design process.

**Vision: Design and implementation of IT in the public sphere**

The literature reviewed for this thesis and the data collected stressed the need to plan and think carefully before implementing an IT system into a public sphere. McCullough (2004) and Griffen (2008) state that some individuals may resist the design and use of technology in a public space, as they feel technology may dominate a space and/or create technological barriers to information. To counteract any negative perceptions people may have regarding technology in the public sphere, an IT system in many ways should be functional enough to foster meaningful interactions with others within a space (McCullough, 2004; Rogers, 2004; Ciolfi, 2004). In addition there should exist the need to communicate to the public why a new IT system is being designed (e.g. what it will be replacing and why) and how it may benefit the space (e.g. assist in breaking down social, economic and cultural barriers to information).

The integration of the MOA CAT into the MVG space was viewed as a key design priority. For example, the system was designed to reflect how people generally experience the museum collection though visual and physical cues (visually seeing the object and/or pointing at the object to show others). For example, the touch screen computers enable museum visitors to look at an object, touch and view information on the MOA CAT - very similar to how people explore the collection within the gallery space.

The MVG was also designed to be very contemporary, clean and elegant, which was a driving force of choosing the MOA CAT Apple touch screen monitors to reflect the feel and look of the gallery space.

The MOA CAT design team wanted MOA CAT to fit into the MVG space, not simply to be placed into the space without a plan and/or understanding of how the system would be used in the MVG space. For example, the design team stressed they did not want the MOA CAT to be a seen as a computer and/or kiosks; they wanted it to be seen as a museum object within the MVG space. To accomplish this the design team decided to strip way all things that associated it with a computer, such as the keyboard and mouse,

in order to give it the same look and feel of the gallery space (P2, P4). The design team also evaluated other design elements such as what kind of colours and fonts were going to be used for signage within the gallery and how this would fit with the MOA CAT design. Lastly, the MOA CAT was designed for people to explore MOA's collection and space in a manner that opposed the normal practice or routine of observation and examination of a museum space. In this sense, there is no right way to use an IT system in the public sphere and therefore it should be designed to meet the anticipated and unexpected needs and wants of diverse users.

The interview data highlighted that the design process of an IT system in the public sphere is a challenging process that may involve collaboration between design team members and ensuring that the design of the IT system reflects the space for which it is being designed. In the following, I will discuss the key challenges outlined by the interview participants regarding the design of MOA CAT for the MVG space.

**Challenges: The design of an IT system in the public realm**

Understanding the challenges that may exist between the formation and execution of design goals may aide in bridging the gaps of knowledge in the design process (Norman, 1988, p.48). For example, how did the thinking and ideas around the design of the IT system in the MVG space translate into the actual physical design of the MOA CAT? What challenges emerged that affected the final design of the MOA CAT? The MOA CAT interview participants stated that working through the design goals and challenges required collaboration between staff members and constant negotiation between what design goals need to be accomplished, and what could be creatively worked through and/or changed during the design process. Similar insights are noted in previous design process research (Catalysts, 2009; Guindon, 1990).

The four key challenges cited in the case study of the MOA CAT included: using a third party service, assessing resources and time during the design process, deciding on the design and placement of information on a IT system, and lastly, designing a language agnostic IT system.

The design challenges outlined here may provide insight into some of the design challenges that may exist regarding the production of an IT system in the public sphere. The following will discuss the MOA CAT design challenges in more detail and how they were negotiated throughout the design process.

**1. The design challenge of using a third party IT service:** MOA wanted to create a function that enabled users to map the location of museums objects. Yet, with limited resources and time it was impossible for MOA to create their own mapping applications and they decided to use the third party service Google Earth. In many instances, this move was viewed as both necessary and worthwhile. However, the use of a third party service such as Google Earth was not easy to integrate into MOA CAT. For Google Earth to work with MOA CAT, it required MOA's information professionals to organize and streamline MOA CAT data to fit Google Earth data requirements. Interview participants cited this as a long and arduous process that required experienced staff persons who could ensure that it worked well and was maintained properly after the system was integrated into the MVG space.

**2. Evaluating resources and assets:** The MOA CAT case study participants expressed a feeling that the design process was never completely done, as there was always more work to be considered and/or opportunities to explore. The practice of assessing resources was cited as an essential practice and a way to manage the MOA CAT design process. It was also seen as way to save resources and time in the design and implementation of the IT system in the MVG space. Thus, there was a need to understand the available resources and time that can be committed to the design of an IT system, as this helps manage the design process and put parameters around the design. To overcome this challenge, MOA strove to design flexible IT systems that were open to future IT developments and directions. It was also noted that having a project manager to manage the time and financial constraints of the design process was invaluable.

**3. Deciding on how information is displayed on an IT system:** One of the main MOA CAT design goals was to create an IT system that enabled users to easily find and search through information in diverse ways. Yet, how does the design team negotiate where information is placed on an IT system to ensure that this goal is met in a public

space? The MOA CAT design team went through various brainstorming and design sketches regarding how information would be displayed and organized on the MOA CAT. Yet, due to the MOA CAT design team's overlapping experience in diverse areas, it was at times challenging to make decisions about how information was going to be displayed on the IT system. Participants cited the need to find balance between people's ideas and perceptions of the IT system, in addition to recognizing what realistically needed to get done given the resources and assets available and to understanding that the format of the design and display of information may change in time.

**4. The challenge of designing a language agnostic system:** One driving force of designing an IT system in the public sphere is for it to be accessible to diverse users. However the realities of designing an IT system that can be easily accessed by users from different cultural and language backgrounds remains a complex area of design. How information is displayed and placed on the MOA CAT is also directly tied to the challenge of creating a language agnostic IT system. As noted previously, the design team hoped that the use of images and videos would enable non-English speakers to use the MOA CAT system. In the beginning of the design process the design team experimented with the use of icons to help non-English museum visitors to search through information. Yet, after much brainstorming and experimentation with icons, it was quickly realized that utilizing icons to help visitors search through the MOA collection was not a viable option. The key challenge facing MOA in the creation of a language agnostic system was that a majority of MOA's data was in English and the task of translating MOA's data into a variety of languages was not an option. To overcome this challenge, the design team worked with the use of imagery and video to display information in different ways in an attempt to make it easy for non-English speakers to find and explore information. However, many interview participants cited this is as one area of design research that still needs more attention and research.

The design challenges cited in the case study were aligned with new design opportunities and directions for the design of IT systems in the public sphere. For example, the design team may not have formed a fully functioning language agnostic IT system, yet they did learn that the research on this topic is a promising area of exploration in information and museum studies, particularly with the growth of cultural tourism and multicultural users in North America. In the following, I will outline how the

opportunities outlined by the MOA CAT interview participants relate to the future design of IT systems in the public sphere.

**Opportunities in design: Design IT for the public sphere**

The MOA CAT interview participants suggested that the MOA CAT may go in many different directions in the future and the opportunities for the system are limitless. This may signify that the design of IT systems in the public sphere may become even more innovative and interactive as time passes, providing a range of opportunities for how technology may be designed and used in the public realm. For example, the interviews suggested that the adding of new technological functions and the future design and use of the MOA CAT is heavily dependent upon the people and partnerships created in pushing the MOA CAT in new directions. Some of the key opportunities listed in the MOA CAT case study results include:

1. The use of muliti-touch technology and the increased use of images and videos on the MOA CAT system.
2. The MOA CAT being able to connect with museum visitors through handheld devices such as smart phones and iPads indicating an opportunity for users to potentially connect and interact with the MOA CAT system though an array of social networking sites and websites (e.g. Facebook and MOA's home webpage).
3. New opportunities in education and programming at MOA. For example, educators may be able to use this public system to plan visits, lesson plans and direct young learners to the site to explore information in ways and forms previously unavailable.

The three opportunities listed are examples of the possible directions an IT system in the public sphere can take: increase use of multimedia, mobile devices and social media and increase emphasis on education. The interviewees anticipate that the design of the MOA CAT will evolve as technology advances and more organizations and people experiment with the use and design of IT in the public realm.

**Summary**

The discussion section outlined how the formation and execution of design goals led the design process of the MOA CAT system in the MVG space. Thus, the MOA CAT case study findings provide context around the key design goals, challenges and opportunities driving the design process of an IT system in the public realm. For instance, the MOA CAT was designed to replace the ageing data books in MOA's visual storage space, indicating that there may be an emerging trend in public organizations and cultural spaces to replace ageing infrastructure with new IT systems designed to interact with diverse users. The challenges and opportunities described here demonstrate how the design process may be influenced by the situations, people and resources that exist within the organization or setting.

The case study results also highlight the importance of collaboration, assessing resources, and defining staff roles in the execution of design goals. I argued that the design process models generally do not address the types of collaboration that may take place between design team members during the design process. For example, the design process is often portrayed as driven by an individual designer and/or collaborating with users in the design of IT systems (Simon, 1969; Schön, 1983; Norman, 1989; Chunghung, 1998). The MOA CAT case study suggests that the design process of an IT system in the public sphere may not involve users, but can still be collaborative in that the process organizational members who do view themselves as designers even though they are influential in setting the design.

The third area of the design process outlined in the findings was the important role that space plays in the design and implementation of the MOA CAT system in the MVG space. Information technology and how it is designed and used in the space may be analyzed through various design lenses. For example, some people feel that technology may take away from the space and/or exclude people from finding information, whereas others may feel that technology in today's world is necessary and adds value to the public sphere if it is designed correctly and reflects the actives and values of a space.

The fourth area of the results focused on the challenges and opportunities that may arise in the design of an IT system in the public sphere. The challenges cited in the MOA CAT study stressed the importance of problem solving, collaboration, and negotiating design goals. Each of the challenges cited in the case study was worked though in some form and demonstrates areas of research that may need to be further explored at MOA, or even other institutions.

The MOA CAT system was designed to be open and flexible to new applications and functions. Some of the design opportunities in the discussion included: the use of multi-touch technology, and the ability for the MOA CAT to connect to museum visitor's handheld devices and social media networks. The interviewees also expressed their excitement over MOA CAT being integrated into MOA's website in Fall, 2010. In sum, the challenges and opportunities outlined in the in this study context for the design process of IT in the public realm and how it may involve various processes, practices and people.

Next, I will outline the limitations of this project and opportunities for future work. I conclude by emphasizing the need for further exploration of the design process in the public sphere.

**Limitations**

This thesis involved a single case study of one museum planning and implementing an information technology. As a result, there is a need to be cautious in generalizing my findings to other museums or interactive systems more broadly. To gain further insight on the design of technology for the public sphere, further analysis of various information systems is necessary. It would also be ideal to interview diverse stakeholders to further document, compare and contrast the design model and process in different settings. In addition, the case study data was organized and synthesized by a single researcher. More analyses of this study's data from diverse research perspectives would provide a greater reliability of the design process of the MOA CAT.

**Future research**

This thesis focused on the design process and experience of designers, but a further examination on how users perceive and use information technology in the public sphere would provide information about the design process. The opportunities listed by MOA staff, such as launching the MOA CAT on its website and making it available via mobile technology, will increase the collection's accessibility and assist people in conducting remote research or planning a visit to the museum, in addition to the opportunities for the MOA CAT to merge with other projects and IT systems at the museum. The discussion of the design opportunities also illustrates how technology is currently being designed in the public sphere and how this may impact how users currently interact and find information within and outside the public sphere.

The results from the case study of the MOA CAT indicate how old information systems (e.g. data books) are being transferred, used and designed into new information systems (MOA CAT). As a result, this helps users locate information on MOA collections though geospatial applications (e.g. MOA CAT "you are here" and Google Earth functions). Studying this transfer of knowledge from one system into another illustrates how IT systems are enabling designers to create IT technology in spaces, another area of study ripe for further investigation.

Lastly, there has been no research conducted to evaluate users' perceptions of the MOA CAT system. It would be valuable to examine whether the goals of the design team are being realized: does the MOA CAT facilitate engagement with and exploration of the museum's collection in the ways envisioned by the design team?

## Conclusion

The public sphere is a dynamic space in our cities and communities that can attract vast numbers and support myriad activities. The important task of designing information technologies for the public realm thus raises key questions of how designers interpret, approach and design technologies for public spaces. In this thesis, I explored the different aspects of the design process in the formation of an IT system in the public sphere, specifically focusing on the MOA CAT situated in the MOA's MVG space. In this thesis, I investigated the design process in the production of the MOA CAT system and sought to better understand the expectations, decisions and vision of information and design professionals in the public sphere. This thesis explored such questions as: What are the design goals and trends of creating the MOA CAT? Who was involved? What were the challenges and opportunities? The exploration of these questions and the findings of this study may contribute to developing a common language and perspective on the design process in the public realm.

In Chapter 2 and the discussion section of this thesis, I outlined different perspectives on the design of IT in the public sphere and their prospective models. The frameworks reviewed and applied in this thesis included: the Rational Problem-Solving process (Simon, 1969) and reflection-in-action paradigm (Schön, 1983), which pertain to the formation and execution of design goals and challenges from either a flexible and/or prescriptive lens. Second, I discussed the design process as a series of steps by summarizing Norman's (1988) Gulf of Execution and Evaluation model and Chunghung DCWS model. I discussed how Norman's model may be applied to the formation of design goals and how it may also be used to evaluate the final design of an IT system. Moreover, I discussed how Norman's Gulf of Evaluation and Execution model might be applied to identify any gaps of information that exist in the design process, particularly in the analyses of design challenges. The Museum of Science, Discovery Centre (DCWS) model steps described by Chunghung (1998) may be applied to outline design goals and help in the management of an organization's request for proposal, staff contracts,

budgets and timelines. Lastly, negotiable and non-negotiable constraints were highlighted as a way to manage design goals and team collaboration, and to realistically access how goals are achieved during the design process within an organization. I argued that although each of the design process models contribute to a better understanding of the design process, no one design model addresses the complexities of the design process of IT systems in the public realm. Thus, different perspectives on design and the design process models contribute to a better understanding of the design of public space IT.

The case study of the MOA CAT demonstrated that IT systems intended for the public sphere need to work within many ideals and concepts associated with public space and that they may to be constantly worked though and evaluated. I examined and discussed the results of the MOA CAT case study in the context of forming and executing design goals, and I emphasized the importance of collaboration in the design process. In addition, I sought to expand the notion of design as an outcome (i.e., a tangible system) to show the multi-faceted and complex process of design in the public sphere. For example, in observing the collaboration of different experts to create the MOA CAT, we see how individuals “find their place,” share expertise, and work within design teams. I argued in the discussion section that design literature often concentrates on the interactions of users with systems, neglecting the rich and complex nature of the work performed and the individuals involved in developing information products. By recognizing the reflection and collaboration involved in the design process, we begin to see design less as a gulf that divides designers and users, and more of a dialogue that occurs between design teams, and then between users and designers, with the goal to design more holistically developed and experienced systems.

Exploring the design process of the MOA CAT system in the MVG space contributed to an understanding of the design process in the public realm and how it can be better documented and evaluated. The case study highlighted the design process from conception and planning through to implementation in order to investigate how the MOA CAT design team collaborated to balance the opportunities and constraints imposed by the collection and the technology with the desire to craft an accessible and interactive interface for a diverse range of visitors. It is hoped that this research will contribute to a greater knowledge of the design process for IT in the public sphere. The case study of

the MOA CAT outlined the alignment of the design process to MOA's overarching strategic goals (e.g. knowledge transfer, accessibility and functionality), and examined how information technology can be harmoniously designed and integrated into a museum space. In the discussion section I emphasized that design goals on the production of IT system in the public sphere are concepts that need to be communicated, evaluated and understood by people designing the system (Rogers, 2004). It is also necessary to have staff who are able to maintain the system and to sustain its purpose and function in the space after the IT system is implemented.

This thesis has demonstrated that design is a human-led process and is thus vulnerable to a range of challenges and opportunities that cannot be planned for and/or fit into any one particular model. The design process in the public sphere may be evaluated from various perspectives, that design may be both a fluid, creative process, and a prescriptive process that needs to organized and managed. Thus, more inquiry and discussion into how the design process of IT in the public sphere is taking place, along with the use and design goals driving the its outcomes, is area of study that continues to be ripe for investigation and exploration.

In conclusion, the design process appears to be mostly organic, at times having a life and history of its own. Yet a key component to its success is the acknowledgement of a team who collaboratively works with design constraints to stay innovative by creating a flexible and adaptable system that is open to change and future opportunities. What we, as well as other organizations, can learn from the example of the design process of the MOA CAT, is that, while the future of IT design in public space is endless, the function of that technology in public spaces will inevitably remain the same – to engage users, encourage exploration of information, and provide accessible resource through a universally understood language. This is the ultimate benefit of generations to come.

## Works Cited


Altman, B., & Viste, K. (April, 2009). GRAMMY Museum Interactives. *Communication Arts*. Retrieved from http://www.commarts.com/interactive/cai09/GrammyMuseum.html

Anderson, G. (1999). *Reinventing the museum, historical and contemporary perspectives on the paradigm shift*. Walnut Creek, CA: AltaMira Press.

Bannon, L.J., Benford, S., Bowers, J., & Heath, C. (2005). Hybrid Design Creates Innovative Museum Experiences. *Communications of the ACM*, 48(3), 62-65.

Bearman, D. (1992). Use of advanced digital technology in public places. *Archives and museum informatics*, 6(3), 2-8.

Bratteberg, I., & Kristoffersen, S. (2008). Irreversibility and force back in public interfaces. In *NordiCHI '08: Proceedings of the 5th nordic conference on human computer interaction* (pp. 63-72). New York, NY: ACM Press.

Brignull, H., Izadi, S., Fitzpatrick, G., Rogers, Y., & Rodden, T. (2004). The Introduction of a shared interactive surface into a communal space. In *CSCW '04: Proceedings of the 2004 ACM conference on computer supported cooperative work* (pp. 49-58). New York, NY: ACM Press.

Carroll, J. (2000). *Making Use: Scenario-based design of human-computer interactions*. Boston, MA: The MIT Press.

Carroll, J. (2003). *HCI Models, Theories, and Frameworks: Toward a multidisciplinary science*. San Francisco, CA: Morgan Kaufmann.

Catalysts. (2009). *The process of design*. New York, NY: Catalysts.

Chong Lee, J., Chewar, C. M., & McCrickard, S. (March, 2005). Image is everything: Advancing HCI knowledge and interface design using the system image. In *Proceedings of the ACM Southeast Conference,* (pp. 376-381). New York, NY: ACM Press.

Chunghung, L. (July, 2008). Mapping the design criterion framework for museum. exhibition design project. In *Undisciplined! Design Research Society Conference 2008* (pp. 16-19). Sheffield, UK: Sheffield Hallam University.

Ciolfi, L., & Bannon. (2003) Learning from museum visits: Shaping design sensitivities. In J. Jacko, & C. Stephanidis (Eds.), *Human Computer Interaction* (pp. 63-67). Mawah, NJ: Lawrence Erlbaum Associates.

Ciolfi, L. (2004). Understanding spaces as places: Extending interaction design paradigms. *Cognition, Technology & Work*, 6(1), 37- 40.

Corry, M. D., Frick, T.W., & Hansen, L. (1997). User-centered design and usability testing of a website: An illustrative case study. *Educational Technology Research and Development, 45*(4), 65–76.

Cresswell, T. (2004). *Place: A short introduction*. Oxford, UK: Wiley-Blackwell.

Dahlgren, P., & Sparks, C. (1993). *Communication and citizenship: Journalism and the public sphere.* New York, NY: Routledge.

Darke, P., Shanks, G., & Broadbent, M. (1998). Successfully completing case study research: Combining rigour, relevance and pragmatism. *Information Systems Journal*, 8(4), 273-289.

Dix, A. (July 18-19, 2002). Managing the ecology of interaction. In C. Pribeanu, J. Vanderdonckt (Eds.), *Proceedings of Tamodia 2002 - First International Workshop on Task Models and User Interface Design* (pp. 1-9). Bucharest, Romania: INFOREC Publishing House.

Dorst, K., & Dijkhuis, J. (1995). Comparing paradigms for describing design activity. *Design Studies,* 16(2), 261-274.

Dourish, P., & Bellotti, V. (1992). Awareness and coordination in shared workspaces. In *Proceedings of the 1992 ACM conference on Computer-supported cooperative work (*pp. 107-144). New York, NY: ACM Press.

Dourish, P. (2001). *Where the action is: The foundations of embodied interaction*. Boston, MA: MIT Press.

Dovey, K. (1985). An Ecology of Place and Placemaking. In Dovey, K. (Ed.), *Place and Placemaking*, *Paper 85 Proceedings* (pp. 93-109). Melbourne: RMIT.

Eriksson, E., Hansen, T. R., & Olesen, A. L. (2007). Reclaiming public space. In *TEI '07: Proceedings of the 1st international conference on Tangible and embedded Interaction* (pp. 31-38). New York, NY: ACM Press.

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, 12(2), 219–244.

Forlizzi, J. (2008). The product ecology: Understanding social product use and supporting design culture. *International Journal of Design*, 2(1), 11-20.

Francis, M. (1988). Changing values for public spaces. *Landscape Architecture*, 78(1), 54-59.

Griffiths, A. (2003). Media technology and museum display: A century of accommodation and conflict. *MIT Communication Forum*. Retrieved from http://web.mit.edu/comm-forum/papers/griffiths.html

Guindon, R. (June 1990). Designing the design process: Exploiting opportunistic thoughts. *Human Computer Interaction*, 5(2), 305-344.

Hansson, M.G. (2008). *The private sphere an emotional territory and its agent*. New York, NY: Springer.

Hornecker, E., & Stifter, M. (2006). Learning from interactive museum installations about interaction design for public settings. In *OZCHI '06: Proceedings of the 18th Australia Conference on Computer-Human Interaction* (pp. 135–142). New York, NY: ACM Press.

Howell, P. (1993). Public space and the public sphere: Political theory and the historical geography of modernity. *Society and Space,* 11(3), 303-322.

Hummels, C., & Frens, J. (September 4 - 5, 2008). Designing for the unknown: A design process for the future generation of highly interactive systems and products. In A. Clarke, M. Evatt, P. Hogarth, J. Lloveras & L. Pons (Eds.), *Proceedings of the 10th international Conference on Engineering and Product Design Education* (pp. 204-209). Barcelona, Spain: Universitat Politècnica de Catalunya.

Kjeldskov, J., & Graham, C. (2003). A review of mobile HCI research methods. In *Human-Computer Interaction with Mobile Devices and Services* (pp. 317-335). New York, NY: ACM Press.

Kostakos, V., O'Neill, E., & Penn, A. (2006). Designing urban pervasive systems. *Computer*, 39(9), 52-59.

Krajcik, J., Soloway, E., Norris, C., & Quintana, C. (2000). A framework for understanding the development of educational software. In J. A. Jacko & A. Sears (Eds.), *Human Factors and* Ergonomics *the Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies and Emerging Applications* (pp. 823-834). Hillsdale, NJ: Erlbaum Associates.

Kristoffersen, S., & Bratteberg, I. (2008). Designing sociable it for public use. In *UbiComp'08: Proceedings of the 10th international conference on Ubiquitous computing* (pp. 252–261). New York, NY: ACM Press.

Landry, C. (2000). *The creative city: A toolkit for urban innovators*. London, UK: Earthscan Publications Ltd.

Lawson, B. (2006). *How designers think: The design process demystified*. Oxford, UK: Architectural Press.

Lee, J.C., Chewar, C. M., & McCrickard, D. S. (2005). Image is everything: advancing HCI knowledge and interface design using the system image. In *ACM-SE 43: Proceedings of the 43rd annual Southeast regional conference* (pp. 376–381). New York, NY: ACM Press.

Lieberman, H., & Fry, C. (May 7-11, 1995). Bridging the gulf between code and behaviour in programming. In *CHI '95: Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 480–486). New York, NY: ACM Press.

Maestri, L., & Muise, K. (March, 2010). *Notes from visit to Museum of Anthropology.* MOA CAT Wiki Project. Retrieved April 25, 2010 from http://wiki.fluidproject.org/display/fluid/Notes+from+visit+to+the+Museum+of+Anthropology+(November+3,+2009)

Manovich, L. (2006). *The poetics of augmented space: Learning from Prada*. Manchester, UK: University of Salford.

Matthews, Rory. (2009). *MOA CAT interface*. Retrieved August 1, 2010 from http://www.rorym.com/projects.shtml.

Matthews, Rory. (2009). *MOA CAT interactive map*. Retrieved August 1, 2010 from http://www.rorym.com/projects.shtml.

McCullough, M. (2004). *Digital ground: Architecture, pervasive computing, and environmental knowing*. Cambridge, MA: MIT Press.

Messeter, J., & Johansson, M. (2008). Place-specific computing: Conceptual design cases from urban contexts in four countries. In *DIS '08: Proceedings of the 7th ACM conference on Designing interactive systems* (pp. 99-108). New York, NY: ACM Press.

MOA.(2010). Museum of Anthropology at the University of British Columbia*. Renewal Project*. Retrieved March 22, 2010, from http://www.moa.ubc.ca/renewal/.

MoMA.(2010). Museum of Modern Art. *MoMa.guide Digital Kiosks*. Retrieved March 12, 2010, from http://www.moma.org/visit/plan/atthemuseum/momaguide.

Museum of Anthropology.(2004). *Museum Renewal Program: The Executive Summary and Feasibility Study.* Vancouver, BC: Museum of Anthropology.

Museum of Anthropology. (2009). *Example of MOA CAT placement in gallery space*. Retrieved from http://wiki.fluidproject.org/display/fluid/Notes+from+visit+to+the+Museum+of+Anthropology+%28November+3,+2009%29

Norman, D.A. (1988). *The psychology of everyday things*. New York, NY: Basic Books.

Norman, D.A. (1991). Cognitive artifacts. In J.M. Carroll (Ed.), *Designing Interaction: Psychology at the Human-Computer Interface (pp. 17-38)*. Cambridge, UK: Cambridge University Press.

Parnas, D., & Clements, P. (1986). A rational design process: How and why to fake it. *IEEE Transactions on Software Engineering*, 12(2), 252-257.

Pirolli, P., & Card, S. (June, 1997). *The evolutionary ecology of information foraging.* Palo Alto, CA: Palo Alto Research Centre.

Rizzo, A., Marchigiani, E., & Andreadis, A. (1997). The avanti project: Prototyping and evaluation with a cognitive walkthrough based on the Norman's model of action. In *DIS '97: Proceedings of the 2nd conference on Designing interactive systems*, (pp. 305-309). New York, NY: ACM Press.

Rogers, Y. (2004). New theoretical approaches for human-computer interaction. In B. Cronin (Ed.), *Annual Review of Information Science*, (pp 38 – 43). Medford, NJ: ARIST

Rosson, M. B., & Carroll, J. M. (2001). *Usability engineering: Scenario-based development of human-computer interaction (Interactive Technologies)*. San Francisco, CA: Morgan Kaufmann.

Schön, D. (1983). *The Reflective Practitioner: How professionals think in action*. London, UK: Temple Smith.

Simon, H. A. (1969). *The Sciences of the Artificial*. Boston, MA: The MIT Press.

Smith, G., Vega, L. C., & McCrickard, D. S. (March 28 - 29, 2008). Education and design: Using human-computer interaction case studies to learn. In *ACM-SE 46: Proceedings of the 46th Annual Southeast Regional Conference (pp. 346–351)*. New York, NY: ACM Press.

Stake, R. (1995). *The Art Of Case Study Research*. New York, NY: Sage Publications.

Stubbs-Lee, Dee, A. (Fall, 2009). Inside Out: A Conservator's Investigation of Museums, Visible Storage, and the Interpretation of Conservation. *Collections*, 5(4) 265-323.

Suchman, L. (1987). *Plans and situated actions: The problem of human-machine communications.* Cambridge, UK: Cambridge University Press.

Tuan, Y.F. (2001). *Space and Place: The Perspective of Experience*. Minnesota, MN: University of Minnesota Press.

Ullman, D. (2003). *The mechanical design process* (3rd ed.). New York, NY: McGraw-Hill.

Zukin, S. (2001). *The culture of cities*. Oxford, UK: Blackwell Press.

# Appendices

## Appendix A: Consent Form

Interview Participant Consent Form (to be printed on SLAIS letterhead)

**THE UNIVERSITY OF BRITISH COLUMIBA**

**SCHOOL OF LIBRARY, ARCHIVAL AND INFORMATION STUDIES**
Irving K. Barber Learning Centre
470 – 1961 East Mall, Vancouver, BC V6t 1Z1
Tel: 604 – 822 – 2404
Fax: 604 – 822 – 6006
www.slais.ubc.ca

**CONSENT FORM**

**In Practice: The Interactive Design process in the public realm**

**Principal Investigator:** Dr. Heather O'Brien, Assistant Professor
Tel: 604 – 822 – 6365; hlobrien@interchange.**ubc**.ca

**Co-Investigator:** Eileen Gillette, MLIS Candidate
Tel: 604-842-3128; Gillette@interchange.ubc.ca

Thank-you for your participating in this case study. This research is affiliated with my MLIS thesis research at the School of Library, Archival and Information Science, UBC.

**Purpose:**

The overall purpose of this research is to learn about your experiences, perceptions and knowledge of the design of Museum of Anthropology Collections Access Terminal and Digital Catalogue System (MOA CAT) at the Museum of Anthropology (MOA) in Vancouver.

In particular, I am interested in the following topics:

- The types of design practices and processes involved in the production of the MOA CAT.
- How interactive designers and others involved in the design process approach the design of information technology, and
- How interactive designers develop information technology specifically for the public sphere.

**What you will be asked to do?**

After you have read this document, I will respond to any questions or concerns that you may have. Once you have signed this consent from, I will contact you and we will discuss a convenient location and time for the interview to take place. The interview should approximately take 60 minutes and will be completed in one day.
The interview questions will address your experiences, knowledge and ideas about the design of the MOA CAT. If possible, please bring any design plans and documents on the MOA CAT to discuss and share with me.

**Risks and Benefits:**

There are no known risks to participating, but I hope that by being involved in this case study you will learn something about your own design practices and experiences. Your practices will be documented and shared with others and may contribute to practitioner-based knowledge about on the production of information technologies for the public sphere and museums.

**Compensation:**

There is no compensation for participating in this study.

**Confidentiality & Anonymity:**

The results of your interview comments/survey responses will be reported without any reference to you specifically. All information that you provide will be treated confidentially and your identity will not be revealed in reporting the study results. Any publications that arise will refer to a “Museum in Western Canada”.

**Data Retention:**

Your name will appear only on this sheet and this sheet will be stored separately from any data collected for this study. No names will be attached to the computer files, and your name will not be used in any written work or in presentations.

**Contact for information about the research project:**

If you have any question about the project, or are interested in receiving further information, please do not hesitate to contact: Eileen Gillette (604-842-3128; Gillette@interchange.ubc.ca)

**Contact for concerns about the rights of research subjects:**

If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at 604-822-8598 or if long distance e-mail to RSIL@ors.ubc.ca or toll free 1-877-822-8598.

I, _____, have read the explanation about this study. I have been given the opportunity to discuss it and my questions have been answered to my satisfaction. I hereby consent to take part in this study. However, I realize that my participation is voluntary and that I am free to withdraw from the study at any time.

Signature: _____ Date: _____

*Version 2: April 1, 2010*

## Appendix B: Interview Script

Interview Script (to be printed on SLAIS letterhead)

**THE UNIVERSITY OF BRITISH COLUMIBA**

**SCHOOL OF LIBRARY, ARCHIVAL AND INFORMATION STUDIES**
Irving K. Barber Learning Centre
470 – 1961 East Mall, Vancouver, BC V6t 1Z1
Tel: 604 – 822 – 2404
Fax: 604 – 822 – 6006
www.slais.ubc.ca
Email: slais@interachange.ubc.ca

**Interview Script:**

**Introduction:**

Hello, My name is Eileen Gillette and I am MLIS student at UBC. Nice to meet you and thank you taking part in my thesis research. I am interested in the design process that goes into the production of information technologies for the public realm, specifically museums. This interview will take approximately one hour and if you have any questions about my thesis research, please feel free to ask.

**Format and Purpose of Interview:**

I wanted to interview you, as you played a key role in the design of the MOA CAT at the Museum of Anthropology. Your knowledge in this area is valuable and will contribute to my investigation of the interactive design process on the production of information technologies for the public sphere.

Just a reminder, that the interview will be recorded and the information you provide will be anonymous. Do you have any questions and/or concerns about being recorded?

**Interview Question design:**

The interview was designed to learn more about your design practices, perceptions and expertise in the design field and your work at MOA. As discussed, this interview is informal and I hope that the questions I ask will encourage a dynamic conversation on the design process of the MOA CAT at MOA.

***Interview Questions:***

*NOTE: This interview and the semi-structured questions are designed to start an informal conversation with the interviewee on the design process of the MOA CAT at MOA.*

1. How did you approach the design of the MOA CAT?

   *Probe 1: How did you secure the contract? Probe 2: engagement, social value and/or entertainment. Probe 3: How would you define your role in the project?*

2. How did you gather background information on the MOA CAT before beginning the project? *Probe 1. Did early design plan change? Did you vision change? Who else was involved?*

3. What were the design goals and expectations of the design?

4. What challenge and opportunities did you encounter?

5. Do you have anything else to add? Any questions for me?

That's great, thank you very much for your time and meeting with me today. It was a pleasure talking with you and learning more about the design process of information technology at MOA from you. Once my thesis is complete, I will send you a copy of it and please feel free to keep in touch.

Thank you again.

*Version 2: April 1, 2010*